



City of Perth

PERTH'S RIVERFRONT 2020

Background & analysis



Acknowledgement

We acknowledge the Whadjuk Nyoongar people, Traditional Owners of the lands and waters where the City of Perth is today and pay our respects to Elders past and present.

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To keep up to date with Perth's riverfront please visit:
engage.perth.wa.gov.au/perth-riverfront

Cultural warning

The City of Perth would like to advise Aboriginal and Torres Strait Islander readers that this document may contain historical photos, images, references or names of people who have passed away.

Disclaimer

The information provided within this report does not claim to be comprehensive. The City of Perth has taken care to ensure this report is accurate, however the City cannot guarantee that it is without error. The report is a snapshot in time and may be modified following further analysis and detailed design. The City of Perth does not accept any responsibility or liability for any loss or other consequence which may result from any reliance on the information contained in this report.

Introduction

The city of Perth has a magnificent setting on the banks of Derbal Yerrigan (Swan River) which is central to its image and character. The panoramic river and city 'postcard' view from South Perth is one of the most breathtaking of any place in the world.

The city's riverfront has strong ecological, cultural, economic and social significance both on a local and regional scale. The opening of the Esplanade train station in 2007 and the recent development of Elizabeth Quay and Barrack Square have all supported an increased focus on the riverfront but its potential as a world class destination has never been fully realised.

Why do we need a plan?

The Draft City Planning Strategy (City of Perth 2020) identifies the need to plan for the future of our riverfront. There is a great opportunity to broaden the current way it is used to meet the additional demands of a growing city population, to encourage more visitation and support tourism.

In addition to sustaining and improving people's experience of the riverfront there are a number of key issues which need to be addressed:

- reconnection of people to the water
- revealing the historical and cultural significance of the Swan River
- augmenting the recreational qualities of the foreshore
- protecting and enhancing biodiversity values

- prioritising people over vehicles
- aging infrastructure including the existing river wall
- the impact of climate change including rising sea levels, increase in the frequency of storm surges and associated flooding.

Study area

The study area focuses on reconnecting the city with the river and Barrack Square with Point Fraser. It includes the riverfront between Barrack Street and the Causeway comprising approximately 32ha and covering a distance of 2.3km from east to west (see Figure 1).

"Cultures and climates differ all over the world, but people are the same. They'll gather in public if you give them a good place to do it."

- Jan Gehl



Figure 1: Perth's riverfront study area

Riverfront report

The purpose of this report is to provide a summary of background information collated to date to inform the development of a future plan for the riverfront. It is an informing document for internal use only.

The report is set out in three main parts:

Part One: Context

This part includes site history and an outline of the strategic context that will inform the masterplan.

Part Two: Perth's riverfront today

Part Two describes the current condition and character of the riverfront and identifies key issues and opportunities to be addressed in the development of the masterplan.

Part Three : Perth's riverfront - future opportunities

Part Three presents potential opportunities for the future of riverfront including:

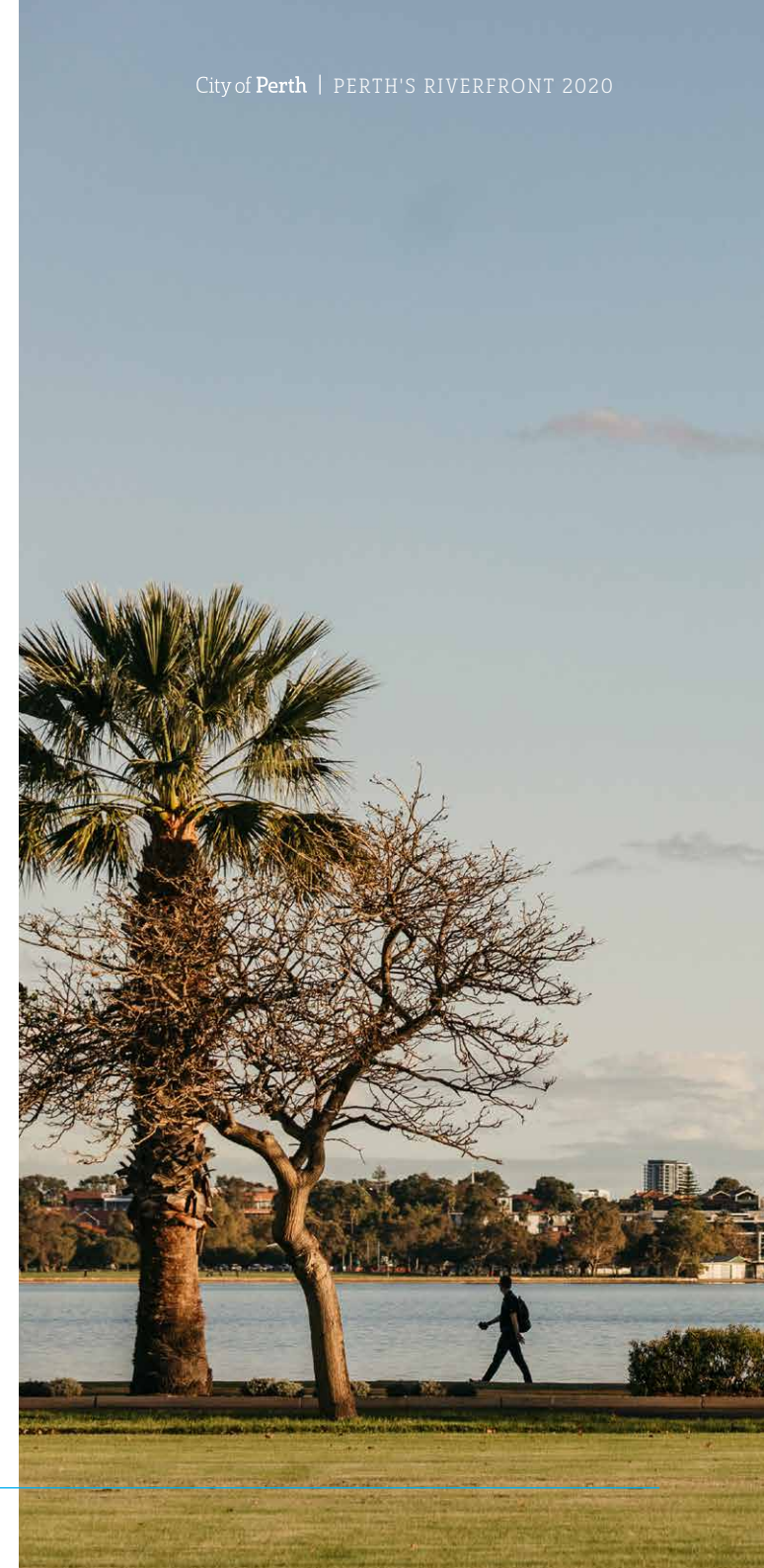
- identifying current global trends in riverfront design
- an analysis of previous plans for Perth's riverfront to identify ideas and concepts that remain relevant today
- establishing urban design principles and key moves
- identifying future opportunities.

The preparation of this report has been informed by the following research reports and initial stakeholder consultation, including but not limited to the following:

- Riverfront Cultural Heritage Assessment Report, Terra Rosa (March 2020)
- Perth Riverfront Public Life Study (June 2019)
- Riverside Drive Concept Indicative Order of Cost Estimate, RLB (March 2019)
- Riverfront stakeholder workshop (November 2018)
- Riverside Drive Feasibility Study and Concept Design, WSP (September 2018)
- Riverside Drive Riverwalls Scoping and Opportunities Study (July 2018)
- Take me to the River: The Story of Perth's Foreshore (2015)

Next steps

The next step will be to establish the community's aspirations for the riverfront and develop a masterplan in close consultation with key stakeholders including Whadjuk Working Party representatives.



Community Consultation – Engage Perth

Stakeholder and community participation in the development of a plan for the riverfront is critical to achieving the best outcome for the project. A survey on the riverfront was posted on Engage Perth from 23 March 2020. We asked the community to identify their favourite spots along the foreshore, what makes them special and what they thought were the essential ingredients that make a great riverfront. As of 13 July 2020, 557 survey responses have been received.

Perth is so fortunate to have such a beautiful, natural, open space so close to the city that can truly be enjoyed by everyone, not just the fortunate few.

Despite being right on the river, there is almost no actual engagement with the water.

Poor mix of activities. There's little to no attractions for visitors to the city/tourists and a lack of facilities dedicated for City of Perth resident use.

I think the road that runs along the riverfront is a missed opportunity to make the best use of the river's natural beauty.

Path and lighting is low quality.

Let's activate and make use of the area around the Concert Hall.

Don't make pedestrians strolling share with cyclists.

Such a pristine and calming area, just perfect to alleviate stress.

I don't love the boring expanse of endless grass. There's nothing to do and no reason to come down here.

I feel much of the riverfront is underutilised and lacks a sense of place, particularly in the cbd.

This surface carpark right on the foreshore is inappropriate for a 21st century city.



Context

Site history

The City of Perth is Whadjuk Boodjar (country). The city is on the area between Gargatup, the place down by the hillside (in Kings Park) and Matagarup, the place of the leg holes (Heirisson Island) where Nyoongars would cross the river.

Nyoongar say that Nyoongar boodjar (country) began during the nytiny (cold time) when the world was flat, soft and featureless. During this time (before people) ancestral spirits dwelt and wandered. The Waarkal (rainbow serpent) was the first to move from the spirit world to the physical world. As the Waarkal moved across this flat land it fashioned hills and valleys in turn forming the rivers, lakes, swamps and wetlands systems of Perth as it coiled around.

The Waarkal journeyed from Kaarta Gar-up (Mt Eliza) to the ocean creating the landscape, including Derbal Yerrigan

(Swan River) and Buneenboro/Gabbee Darlbal (Perth Waters located between the Narrows Bridge and the Causeway), along the way.

The Waarkal still exists within the river, evidenced by the water flow. It is believed that the health of the river reflects the health of the Waarkal which in turn is intrinsically linked to the health and wellbeing of the Whadjuk culture.

Whadjuk Nyoongar people camped and lived along the Swan River and its surrounding freshwater swamps and wetlands for at least 40,000 years prior to settlement (Bolleter. p1).

These areas were abundant with food, freshwater and other resources that provided significant spiritual and physical sustenance. Traditional foods found in Buneenboro/Gabbee

Darlbal included yakan (turtle) and noorook (turtle eggs), kooya (frogs), jilgies (freshwater crayfish) and djljit (fish).

"To me, that's culturally the most significant protocol that needs to be adhered to; the cleansing and the spiritual aspect of water in coming into the Perth CBD"

- Whadjuk Nyoongar Traditional Owner:
Diane Stack



Figure 2: Excerpt from Gnarla Boodjar Mili Mili (Our Country on Paper) - Department of Local Government. Sports and Cultural Industries.

Although the whole of Perth's riverfront is a place of great spiritual, economic and cultural importance to Whadjuk Nyoongar there are specific sites of importance (Cultural Heritage Assessment Report, 2020). These include:

- Kilang Minangaldjkba, a freshwater spring also known as 'turtle spring' located near the Causeway Bridge.
- Deedaliup/Dyeedyallalup which is the river edge and the springs located to the east; an area favoured for its proximity to food, water and ochre sources and as a vantage point for looking over the crossing, Mattagarup. Ceremonies, competitions and gatherings took place here.
- Campsites were frequently located along Bidis (tracks) with one extending from Burswood camping area to the Supreme Court Gardens.

The first European explorer of the Swan River was William de Vlamingh in 1696. In 1801 the French surveyor de Freycinet traveled up the Swan River as part of the Baudin exploration of the west coast of Australia. He recorded his findings in a preparatory sketch which included numerous annotations about the character of the surrounding landscape (see Figure 3). A subsequent map was prepared by Heirisson, the surveyor in charge on the same voyage. This is thought to be the first detailed map of the river (see Figure 4).

European settlement did not occur until later in the 1800's. At that time, the British explorer Stirling's descriptions of the upper Swan River landscape as a park like arcadia attracted up to 2000 settlers to the newly established colony and the city was founded in 1829 (Bolleter. p 13). The decision to

locate the settlement's port at Fremantle freed up the riverfront for recreational use, with land set aside for this purpose on Arrowsmith's first plan for Perth in 1833. This opportunity was lost with the subsequent subdivision and development of this land (Bolleter. p 15). Other changes to the city grid resulted in the loss of a generous town square proposed around Victoria Square and a large parade ground, located between Barrack and Pier Streets, which opened to the river. These developments were to have a significant impact on the future planning of riverfront..

In the late 1800's a massive program of reclamation works began along the riverfront, driven by the state's increasing population and wealth generated by the gold rush (Bolleter. p 25). Work commenced with the reclamation of the Esplanade in 1879, followed by the Supreme Court Gardens in 1903, and were largely completed by the 1930's with the infilling of land up to Point Fraser (see Figure 5).

The reclamation works can be partly explained by a desire to tidy up the riverfront. Poor sanitary conditions



Figure 3: de Freycinet preparatory sketch.

contributed to perceptions of the riverfront as a source of disease, partly reinforced by a typhoid epidemic in the 1890's. It was also a breeding ground for mosquitoes (Bolleter. p 43).

The works were also intended to recreate the city's parkland setting and compensate for the lack of parks within the city grid.

It was a particular concern for WE Bold, the city's Town Clerk from 1900 to 1944, that Perth had never developed a ring of parklands like Adelaide, Sydney and Melbourne (Bolleter. p 38 -39). His vision and subsequent plans for the reclaimed land were greatly influenced by the City Beautiful and Garden City Movements and a belief that grand, civic parks can civilise both the landscape and city dwellers (Bolleter. p 39).

It was considered that adopting such international models of open space planning would help establish Perth as a modern and world class city, able to hold its own with other

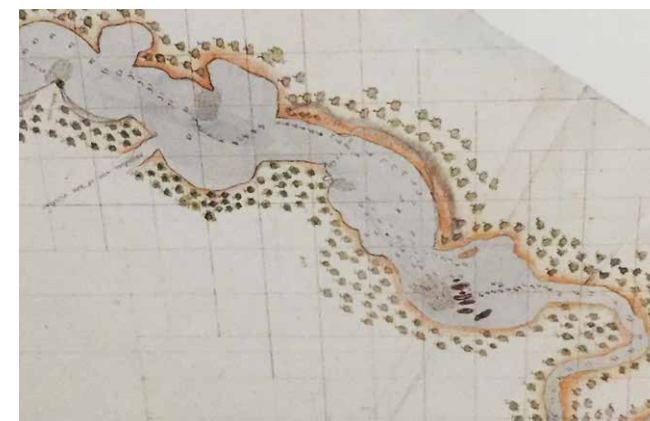


Figure 4: Heirisson's map.

Australian capital cities. This thinking underpinned the 1887 Public Works Department plan for riverfront which included a large ornamental lake, botanic gardens, scenic walks and a cricket and sports grounds, all set within a unified, riverfront park (Bolleter. p 30).

Similar themes appear in many subsequent plans including the 1957 John Oldham plan for a proposed botanic garden that would extend from the UWA campus, along the river foreshore and into South Perth.

However, none of these plans went ahead, partly due to funding issues and the arrival of World War II (Bolleter. p 30). The open space at riverfront was instead largely used as a space to hold significant civic events and celebrations, along with a range of formal and informal sporting and leisure activities.

Given its large open character Langley Park as also used as an airstrip. Between 1920 and 1924 Western Australian Airways used it to conduct Australia's first regular airmail service. It continued to facilitate intermittent air services for medical services and air shows until recent times.

Langley Park is also significant as the site of the No. 2 low level sewage pumping station which was part of Perth's first sewage system (Heritage Council of Western Australia Register Entry Assessment Documentation).

Reclamation also saw the collection of jetties and maritime sheds along riverfront largely cleared away. The WA Rowing Club boatshed (1906) is the last remaining building that reflects the diversity of recreational and transportation activities that took place on the river during the first 100 years of the colony.

Other notable structures included the City of Perth Baths

(1898), accommodated in an ornate Moorish style building on a 300 ft jetty approached from the Esplanade. The baths were demolished in 1920 and relocated to Crawley, due to problems with shallow, muddy water and jellyfish.

The early years of colonisation saw Whadjuk Nyoongar people dispossessed of their land. This impact continued with the establishment of the Prohibited Area between 1927 to 1954; a zone around the central city that excluded Aboriginal people in order to exert greater control over their movements and interactions. The section of the riverfront between Barrack and Bennett Streets was included within its boundary.

The Prohibited Area was partly driven by "White City", a temporary amusement park constructed on the Esplanade in 1927. It was considered morally damaging influence by A.O. Neville, the Chief Protector of Aborigines who successfully used it as an argument for the introduction of the Prohibited Area. White City was demolished in 1929 (Bolleter. p 50).

As Aboriginal people continued to be excluded from many of the restaurants and bars in Perth until the 1960's, public spaces like the Supreme Court Gardens and the Esplanade became important gathering places. They were also the locations of regular political meetings. (City of Perth Karla Yarning).

The emergence of the car as the dominant form of transport resulted in the construction of Riverside Drive in 1937 as a major arterial road dominating the river's edge. Proposals to upgrade it to a city ring road, in support of the freeway system set out in the 1955 Stephenson-Hepburn plan, were later successfully resisted (Bolleter. p 59).

By the 1980's there was a growing desire to address the impact of Riverside Drive and the vacuous green space that had characterised riverfront since the completion of Langley Park in 1920. A multitude of plans (over 200 concepts) were produced over subsequent years including a more modest plan by John Oldham (1985) to reroute Riverside Drive to Terrace Road and locate recreation spaces on the foreshore.

In 1991 the brief for the Perth Foreshore International Urban Design Competition reflected a desire to assert a sense of place for Perth, derived from its unique landscape. This theme continued with the construction of Point Fraser in 2003 as an innovative demonstration wetland and recreational landscape.

Recent aspirations for Perth to position itself as a world class city saw the State Government commence Elizabeth Quay in 2012, a mixed use development that seeks to reconnect the city with its foreshore in an urban manner.

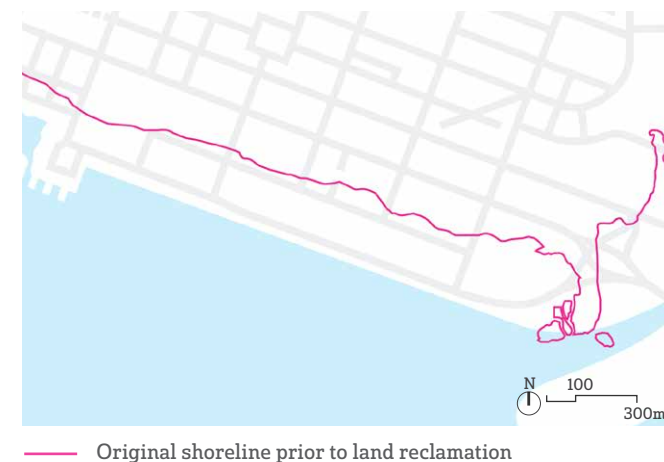


Figure 5: Extent of reclamation works.

Site history

The timeline below summarises key points in the shaping of Perth's riverfront today:



**Pre European
settlement**



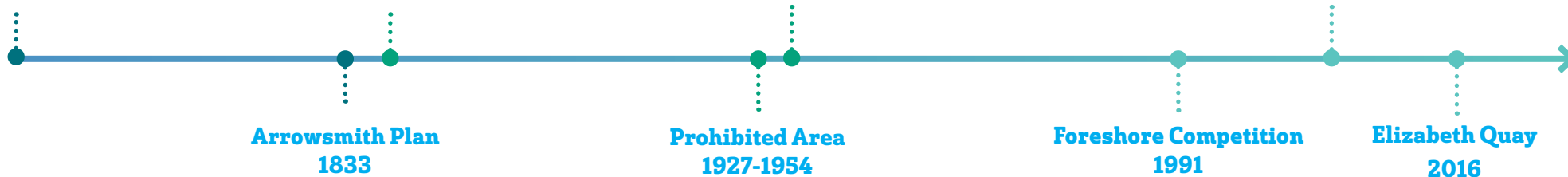
**Public Works Dept Plan
1887**



**Riverside Drive
1937**



**Point Fraser
2003**



**Arrowsmith Plan
1833**



**Prohibited Area
1927-1954**



**Foreshore Competition
1991**



**Elizabeth Quay
2016**



Strategic framework

The City of Perth has set a clear direction for development in its Integrated Planning and Reporting Framework (IPRF).

The intent of the IPRF is to ensure the priorities and services provided by the City of Perth are aligned with community needs and aspirations. The IPRF and the role of a riverfront masterplan is outlined in Figure 6.

The City of Perth Strategic Community Plan (2019-2029) sets out the community's vision for Perth as a beautiful and connected place that provides vibrant, diverse and friendly experiences. It provides the long term strategic direction and guides the City's delivery of services.

A future plan for Perth's riverfront will take account of the relevant aspirations and objectives for Perth's future development as set out in the Strategic Community Plan and other relevant City strategies and action plans. It will also draw on the findings from relevant informing studies that provide technical input on a range of issues.

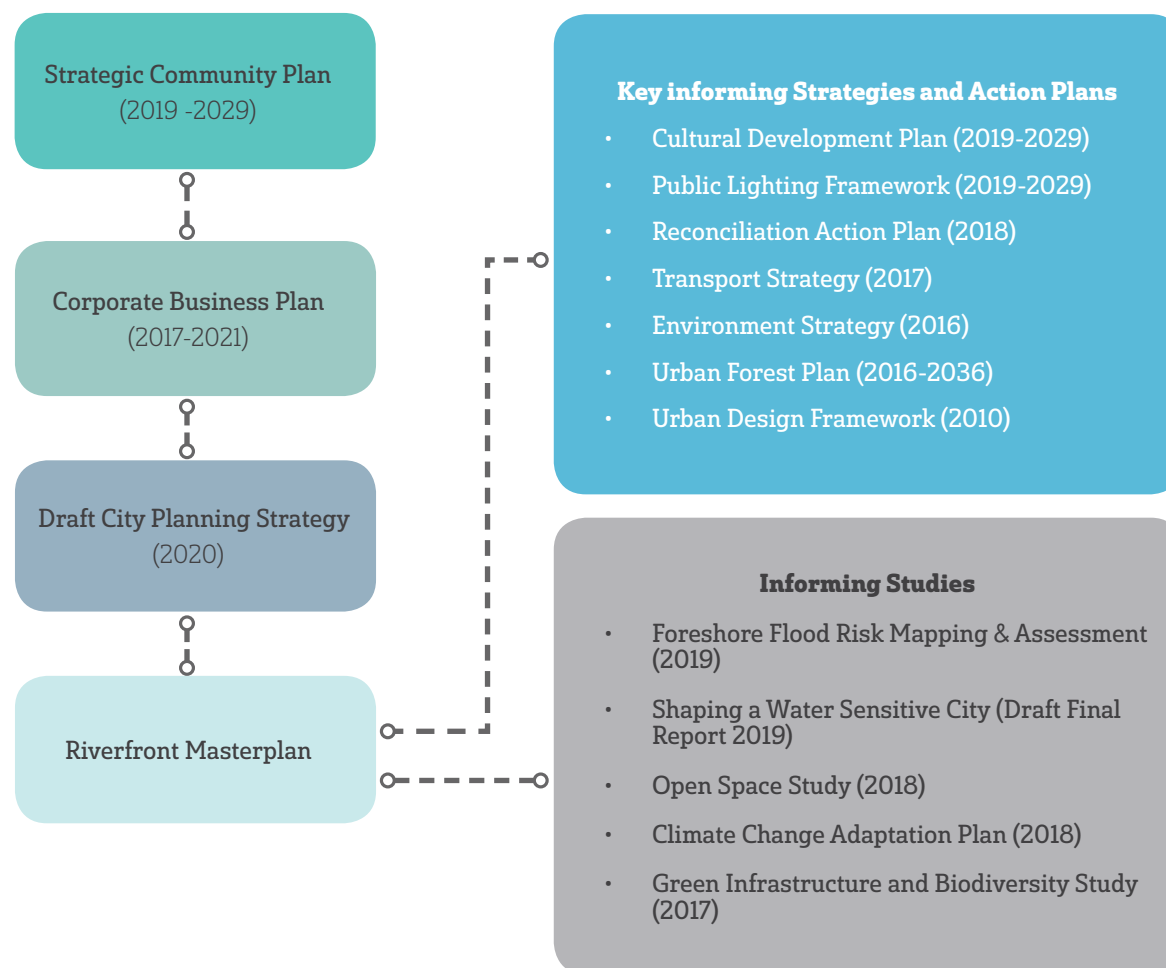


Figure 6 : Integrated Planning and Reporting Framework.

Governance and land management

The governance of riverfront is complex. There are several lots of land which have different land classifications, management structures and legislative requirements.

Land classification

The riverfront is classified as a reserve under the State Government's Metropolitan Regional Scheme (MRS) for a range of purposes including Parks & Recreation, Primary Regional Roads, Other Regional Roads and Public Purposes - Car Park.

Planning authority

Applications for development within or on the river are determined by the Department of Biodiversity, Conservation and Attractions (DBCA) and the Swan River Trust (SRT).

Other applications are determined by the Western Australian Planning Commission (WAPC) and managed by the Department of Planning, Lands and Heritage (DPLH).

WAPC refers applications to all relevant agencies that have an interest in riverfront, including bodies such as the Environmental Protection Agency and State Heritage. Langley Park and Supreme Court Gardens are both listed on the State Heritage Register and the City of Perth (CoP) City Planning Scheme No. 2 Heritage List.

- An application to State Parliament is required for any amendment to the use of Class A reserves. This process is facilitated via DPLH and can have significant time and budget implications.

- Parliamentary approval is also required for a range of reclamation works.
- Where an application is likely to have an impact on the river it is referred to DBCA and the SRT.
- Some applications for public works are exempt from approval (e.g. maintenance and associated minor works).

Care and control

Day to day care and control is split across different management agencies (see Figure 7) including:

- Department of Biodiversity, Conservation and Attractions

- City of Perth (as part of a management order)
- Main Roads Western Australia (MRWA)
- Department of Planning, Lands and Heritage.

Key legislation

The following legislation has the potential to impact on the development of riverfront:

- Aboriginal Heritage Act (1972) and Section 18
- Swan and Canning Rivers Management Act (2006)
- State Heritage Act (2018)

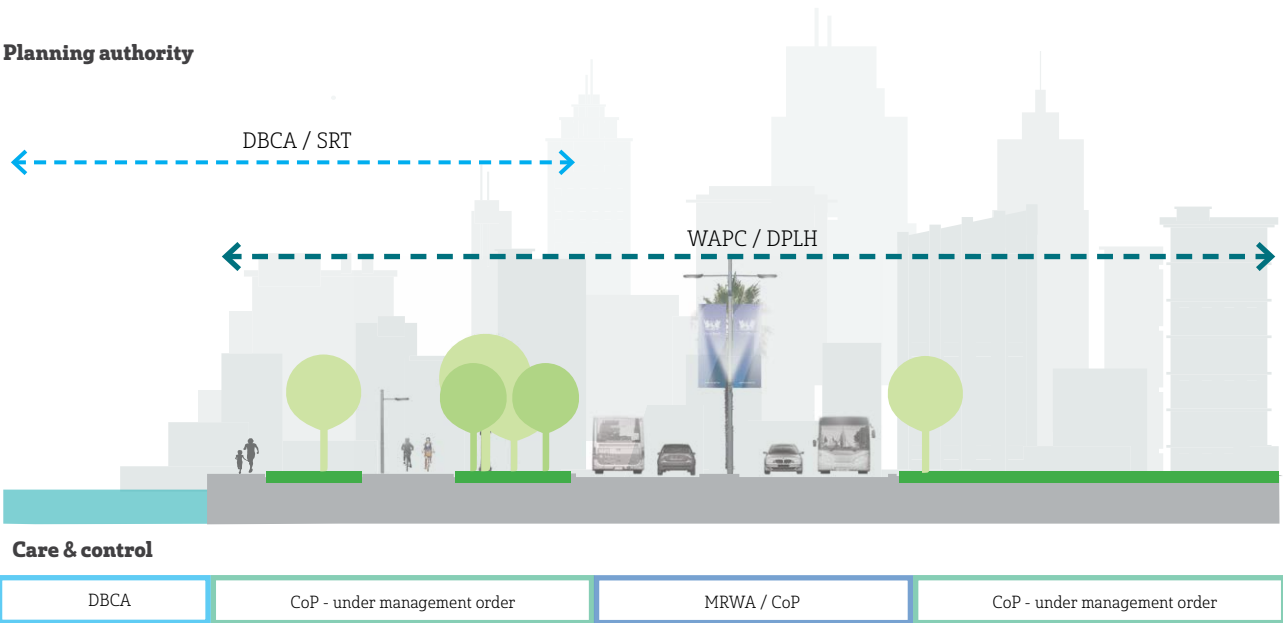


Figure 7 : Governance and land management.



Perth's riverfront today

***"Public life is what people create
when they connect with each
other in public spaces - the
streets, plazas, parks and city
spaces between buildings."***

- Gehl Architects



Perth's riverfront

Analysis of the current character and condition of the riverfront has helped to identify some key issues and opportunities that should be addressed in a future plan to help realise its untapped potential.

This analysis and key findings have been structured around the following themes:

- Place
- Movement
- Environment

These three themes are mutually reinforcing components that provide a strong foundation for successful public spaces and a vital, active public life.

Successful spaces have a strong sense of place and a high quality environment. Their design responds to human scale and senses and they pay careful attention to the diverse needs of all users. This creates the platform necessary for public life.

Movement is a key enabler of places. Allowing people to move to and through public spaces conveniently, safely and comfortably on foot, by bike or public transport is essential to support public life.

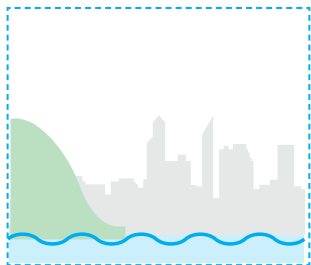
Careful consideration and management of the natural environment delivers a range of benefits (ecosystem services) that promote community health and well-being and create attractive and comfortable places where people want to spend time.



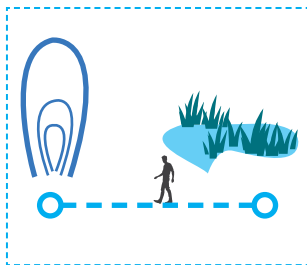


Place

Strengths (things to build on)



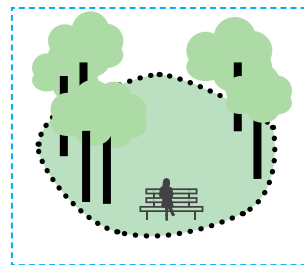
Unique setting



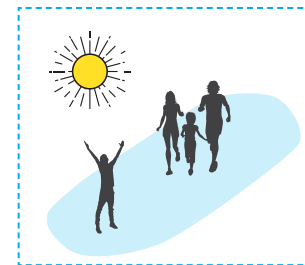
Bookended by Elizabeth Quay and Point Fraser



Large green open space for large scale events



Supreme Court Gardens



Good climate - most number of sunny days of any capital city

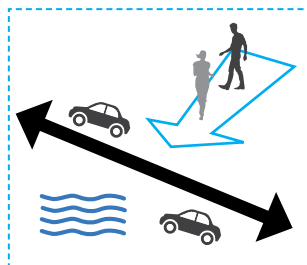


High numbers of people using the space for recreation on weekends

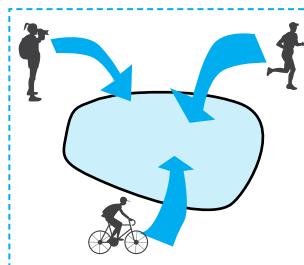
Challenges



Cultural heritage and historic significance not acknowledged



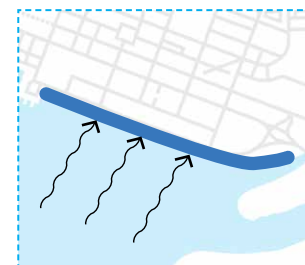
Limited opportunities to get close to the water



Few reasons to visit and stay



Lack of human scale



Microclimate - wind swept



Low user numbers/limited diversity

Place

Sense of place

The importance of creating sense of place

Public places that acknowledge and celebrate their physical, cultural and historic context have a strong identity and sense of place. This helps to foster a sense of community pride and attachment to the place in which they live. Building these emotional connections helps to draw people to a space and encourage public life.

Perth's riverfront has a strong identity within the city and is a place of great community significance.

However there is significant potential to strengthen some key aspects of riverfront's physical, cultural and historic context.

Unique setting

Perth's riverfront and topography provides a magnificent city setting.

- The view of the city from the top of Mt Eliza in Kings Park, is iconic and has been consistently used by painters and photographers to capture the image and evolution of the city since European settlement began.
- The green, open setting with views to the Perth City skyline provided by riverfront, is greatly valued by the community.

This physical setting should be acknowledged and celebrated.

Cultural heritage

Riverfront has a rich cultural history which is essential to preserve and express, however, it this is poorly done at present. The Cultural Heritage Assessment report (2020) notes the following issues in particular:

- Aboriginal heritage sites and intangible cultural knowledge is not expressed
- Nyoongar place names are not acknowledged
- cultural protocols are not recognised
- sites that represent early European settlement lack expression and interpretation.

Access to the water

Despite its waterfront setting there are currently few opportunities for people to access, interact and enjoy the water, other than walking, jogging or cycling along the riverfront.

The majority of riverfront is characterised by an inaccessible hard edge. Any on-water activities are limited to the eastern and western ends (WA Rowing Club and On the Point at Point Fraser) with the distances between them vast and fragmented. Providing facilities for people to get close to the water is a key opportunity for the future.



No visibility of Aboriginal culture



Limited visibility of site history



Limited interaction with the river

Place

Population

The city has approximately 30,000 residents which is one of the lowest residential populations of Australian capital cities. It also attracts over 200,000 people on a typical workday including a workforce of over 145,000 people.

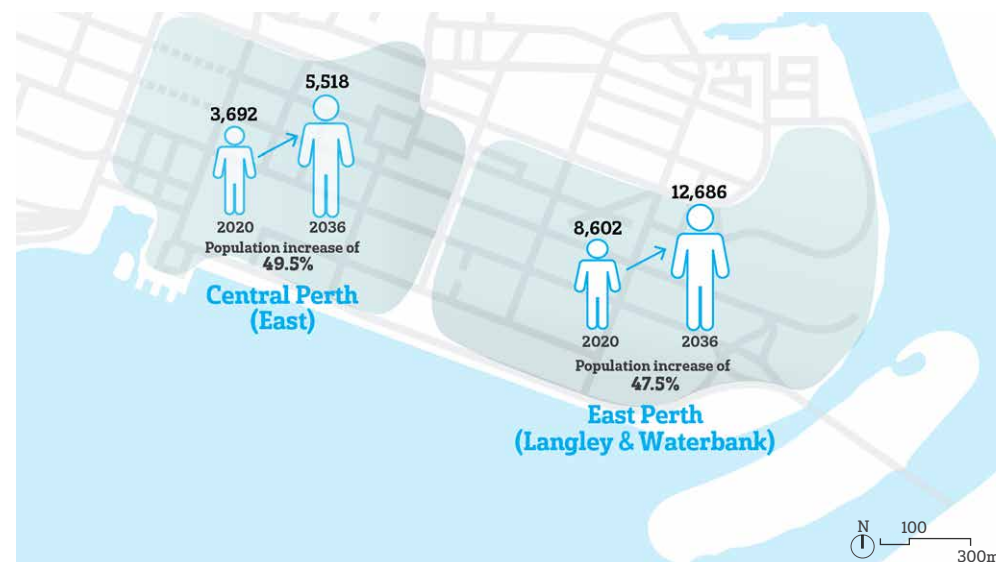
The draft City Planning Strategy (2020) has set a target of 90,000 residents living in Perth City by 2050 to help activate and diversify the city, allowing it to meet its full economic and social potential.

While there is a large residential population adjacent to Perth's riverfront, significant population increases are predicted. City growth targets are also expected to contribute to higher worker, student and visitor numbers overall.

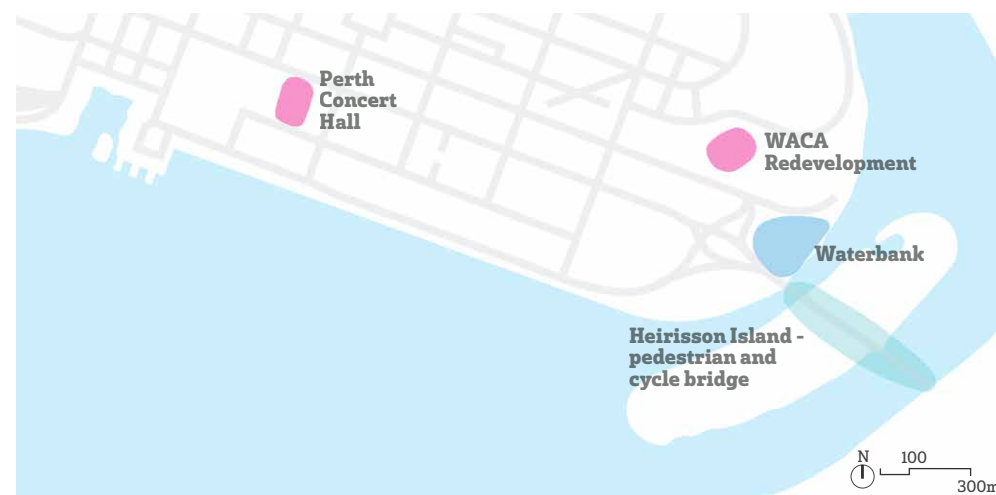
The planning strategy recognises that investment in key community facilities, such as schools, sporting and recreational facilities and public open space, has not kept pace with community needs. Nor has it been harnessed as a stimulus to attract new residents.

Projected population growth, along with key future developments in the vicinity of the riverfront, will create new demands and opportunities. These developments include, but are not limited to:

- Perth Concert Hall and surrounds
- WACA redevelopment
- Development WA Waterbank
- Heirisson Island pedestrian and cycle bridge



Projected population change



Key future development - vicinity of Perth's riverfront

Place

Future open space requirements

The City's Open Space Study (2018) looked at the provision, access, type and quality of open space. This included an assessment of the current and future role and function of the open space along riverfront.

Overall the study found that although Perth performs better than other Australian capital cities on the amount of open space provided per person, it is under supplied when workers and visitors are considered in the city's total population figures (3.36ha/1000).

The study notes that as the population increases and the city becomes more urbanised it will be important to protect and improve its existing network of open space, given its contribution to city livability and community physical health and mental well-being.

As such, the city's existing open space will be required to work harder. Accessible, flexible and multi use spaces are needed; providing diverse activities and functions to meet the needs of a wide range of demographic groups.

With regard to riverfront, the study recommends that it is considered in the context of its greater role in the Perth region, as well as its potential for the city. It should:

- reflect the unique character of Perth
- connect key tourism destinations and provide improved access and facilities to attract tourists
- provide environmental corridors
- service the community's open space needs.

The study also notes the:

- importance of riverfront as a city event space for iconic festivals, civic events and community celebrations that reflect Perth's capital city status and attract international, national and state visitors, in addition to residents and workers

- need to retain Langley Park as one of only two city open spaces large enough to accommodate infrastructure needed to support organised sporting events
- potential to develop more open space in a manner similar to Point Fraser to help improve the riverine environment.
- potential to day light existing drainage infrastructure by bringing it to the surface to create 'living streams'.



Active space



Events space



Nature space

Place

Public life

Public life and the quality of public space

The level and type of activity that takes place within public space is an important indicator of its quality.

A large number of people taking part in necessary activities, such as walking to or from work or waiting for public transport, is not indicative of a high quality public realm. People will take part in these activities regardless of the quality of the environment.

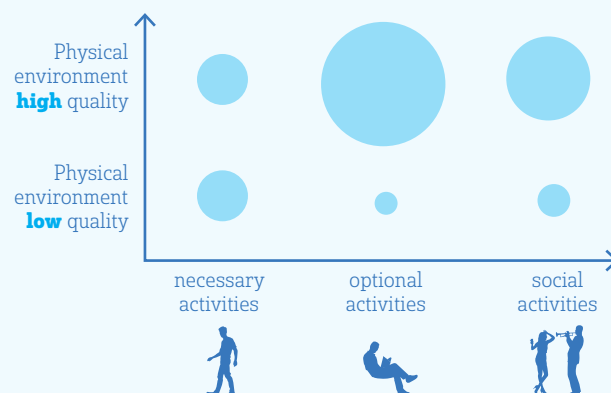
Successful public spaces are characterised by a diverse range of user groups and a predominance of optional (things people want to do) and social (interacting with others) activities. These will only occur if the physical setting of the place is of high quality giving people both reason and opportunity to spend time in public space.

Public life studies investigate the level of diversity in user groups and the types of activities being undertaken, where and when as basic benchmarks for understanding and measuring public life. These studies are mainly carried out on a normal weekday and weekend during fine weather to get as representative a picture of public life as possible.

The studies can collect a range of data including:

- Pedestrian and cyclist moving counts - recording how people move through space as a key baseline of a city's public life
- Age and gender counts - recording gender and age groups present in a space to help understand how inclusive/exclusive it is
- Stationary activity mapping - measuring what people choose to do in public space such as sitting, standing, active recreation, cultural activities.

The City commissioned a Perth Riverfront Public Life Study (2019) to capture and quantify the amount and ways the riverfront is used.



Gehl Architects have identified 12 criteria for the design of high quality public spaces that support vital and diverse public life. These have been used to inform the analysis of riverfront.

Protection



Comfort



Enjoyment



Source: Gehl Architects

Place

Activity

The Perth Riverfront Public Life Study collected a range of data on who uses the space, how and when.

Data was collected in early March 2018 on a regular week day, and at the weekend, between the hours of 7am and 10pm. The main findings from the study are presented below.

Limited diversity

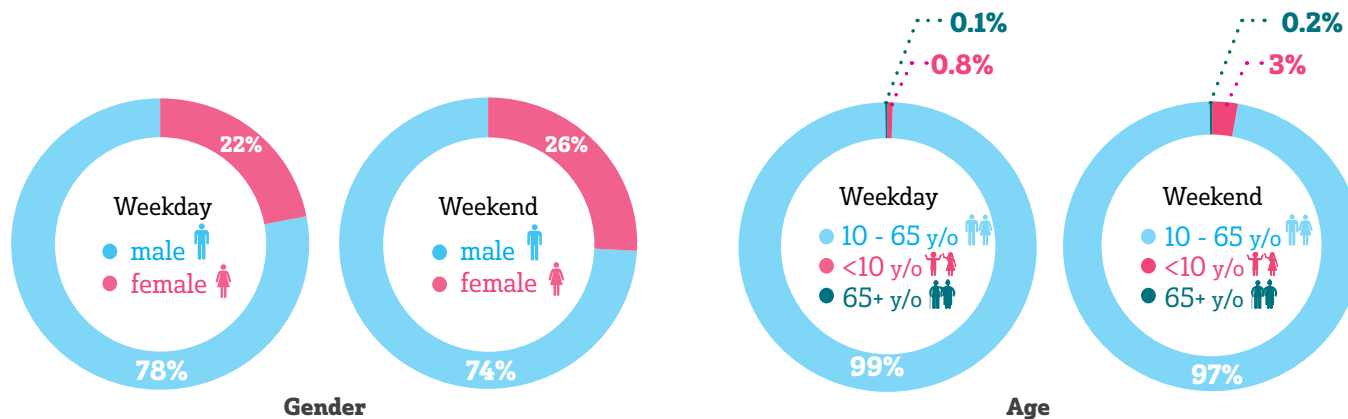
There are few women, children and older people visiting the riverfront suggesting that there is not a variety of activities on offer to attract a broad section of the community.

Types of activities

Although there are a number of significant events held at riverfront, its primary day to day function is for recreation:

- Riverfront is mostly used by people running and cycling along the riverfront or commuting to and from work.
- People moving to or through riverfront greatly outnumber those engaging in stationary activities.
- most common stationary activities are standing and sporting activity

On weekdays there are more people recreating than attending planned events while on the weekend the trend is reversed.



Running & walking



Cycling



Sports



Sitting / Relaxing



Events



Skateboarding

Place Activity

The edge effect - why the edge is preferred

Known as the edge effect, the edges of public space hold a magnetic attraction for people. Here our senses can master the space, we are facing what is happening and our backs are covered.

The principle of good edge placement can be traced back to our caveman ancestors. They sat with their backs against the wall in their caves (so no surprises came from behind) with the world in front of them. (Gehl, 2006)

Placement along edges is extra important in city space where longer stays take place among strangers, because no one wants to signal that they are waiting alone!



Location of activities

Certain areas of riverfront are used more than others based on a measurement of the numbers of people per square metre. Recreation is concentrated on the foreshore, at the edge between riverfront and the city and near trees.

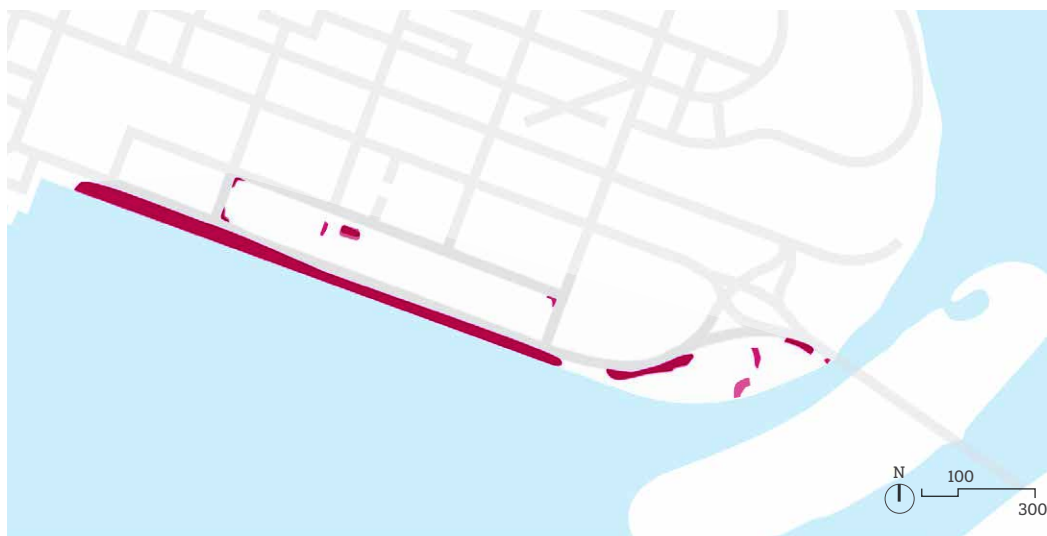
There are significant differences in levels of activity between the eastern and western ends of riverfront.

- Levels of pedestrian movement and stationary activities are higher west of Victoria Avenue on both weekdays and at weekends.
- Within the eastern section there are significantly higher levels of activity at the weekend compared to its weekday use.

Times of activity

Levels of activity vary across the day with peaks generally occurring in early morning and evening:

- on weekdays pedestrian levels peak at commuting times and lunch time (i.e. between 7-8am, 12-1pm and 5-7pm) and stationary activities peak between 12-1pm and 6-7pm.
- at the weekends pedestrian levels peak between 8-9am and 6-7pm. The level of stationary activity is more sustained across the day compared to weekdays.
- the proportion of pedestrians compared to people staying is similar at weekends and weekdays.



Weekday and weekend

Place

Activity

Events and destinations invite and attract people to a space, giving them a reason to come, linger and connect with others. A wide range of activities and functions support a vibrant public life both during the day and after dark.

There is a general lack of attractions and destinations at riverfront to draw people to and through the space, particularly after dark.

Riverfront attractions and destinations

- Key attractions tend to be concentrated at the eastern and western ends with the exception of a small children's play ground and toilet/changing facility at Langley Park.
- There is a general lack of facilities and infrastructure required to support optional and social activity.
- Few food and beverage venues exist along riverfront.
- There are few instances of outdoor dining.

The night time economy

- There are few permanent night time entertainment and hospitality venues.
- In 2019, eight night time events were held, one of which was held every night over a month (open air cinema at Ozone reserve).
- Limited night time attractions means low levels of activity after dark which also impacts on perceptions of safety.



Riverfront attractions and food and beverages venues



Permanent night time uses

Place Activity

Events

Riverfront hosts a variety of events over the year. Its picturesque and prominent location, with sightlines from South Perth, Mitchell Freeway and Kings Park provides great promotional visibility for event organisers.

Events range from children's birthday parties and fitness classes through to major celebrations such as the Australia Day Skyworks with crowds of 100-150,000 people attending.

Most events are held at the Supreme Court Gardens and Langley Park, during the warmer months between October and April.

While Langley Park is the only location where large capacity events can be held, both spaces can host large scale events. Their extensive grassed areas allow for great flexibility in the way they can be used. However, noise regulations limit the number of events that exceed noise regulations to six per year.

Some key issues to be considered to improve riverfront as an events venue include:

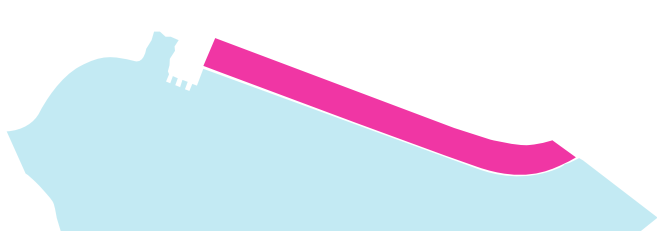
- the need to minimise impact of road closures and traffic congestion on surrounding businesses and residents
- Supreme Court Gardens and Langley Park are susceptible to water logging and flooding during winter
- substantial recovery times are required between events to ensure the parks are well maintained
- varying scale of events means its difficult to design permanent event infrastructure
- the cost of providing hostile vehicle mitigation and temporary events infrastructure can be prohibitive for some event organisers
- inadequate footpaths and poor walking environments also create access impediments. This is an issue for all visitors but especially the elderly, children and people with mobility impairments.
- mass crowds and a police presence at large scale events provide a sense of safety and comfort for pedestrians walking to train stations at night, but this is not the case for smaller scale events.



Place

Size

Comparing the size of Perth's riverfront to other known spaces is one way of understanding its size and what may be possible there.



Perth riverfront

Size: 32 hectares

Attractions

- Parklands and lawns (events space)
- Riverfront pedestrian & cycle path
- Small children's playground - local scale
- WA Rowing Club and cafe
- On the Point - food and beverage venue
- Bike hire
- Point Fraser Wetlands



Southbank Parklands, Brisbane

Size: 17.5 hectares

Attractions

- Cultural precinct including art galleries, theatre, museum and library
- Swimming facilities (artificial beach)
- Wheel of Brisbane
- Children's playground - regional scale
- Pedestrian and cycle bridge to Botanic Gardens
- Amphitheatre
- Food and beverage venues
- Tree lined riverfront promenade - walking, cycling, jogging
- Walking tracks - arbor, rainforest walk
- Community garden
- Parklands and picnic areas



Scarborough Beach, Perth

Size: 9.9 hectares

Attractions

- Scarborough Beach Pool
- The Snake Pit - skate park, climbing wall & basketball
- Children's playground - regional scale
- Outdoor amphitheatre and events space
- Urban plazas
- Upper promenade - retail, food and beverage outlets
- Lower promenade - jogging, cycling and other active uses
- Shade arbors
- Sunset Hill - viewing point
- Surf Club and restaurant

Place

Scale

"We need to move away from trying to activate dead spaces with events towards designing spaces that aren't dead to begin with."

- Gehl Architects

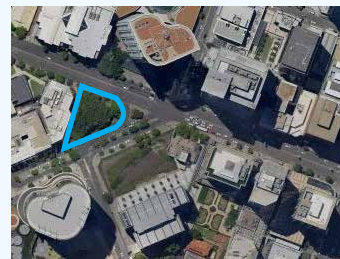
Why scale is important

Understanding scale allows designers to provide good city spaces for pedestrians that take into account our social nature and habits and how they are connected to the physical habitat we live in.

Behavioural aspects, sensory experiences and stimuli needed for the human brain are all aspects that should inform the design of city spaces. As human walking speed is approximately 5km an hour, details that heighten our senses are very important, with stimuli needed approximately every seven seconds.

In public space with distances of 25 - 100m very little of our senses are used, however, when this range is reduced to 0-7m all details are experienced. As humans respond to thousands of subtle cues in a matter of seconds, small dimensions offer greater opportunities for experiences to be intensified.

When it comes to scale 'small is beautiful' - this will keep the atmosphere concentrated and the expectations high. Small in scale means exciting, intense and 'warm'. Large spaces and large buildings signal an impersonal, formal and 'cool' environment (Gehl 2006).



*Florence Hummerston
Central Perth
0.2 ha
Micropark*



*Yagan Square
Central Perth
1.1 ha
City Square*



*Russell Square
Northbridge
2.0 ha
Neighbourhood Park*



*J H Abrahams
Crawley Nedlands
5.3 ha
District Park*



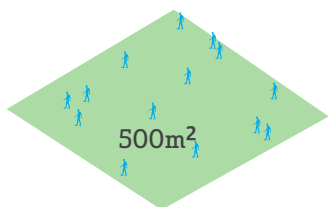
Size

Small scaled spaces are easy to program and feel busy.

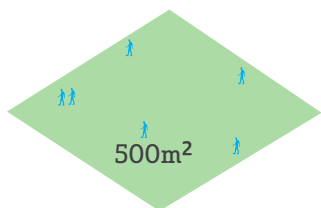
Large spaces need high density immediately nearby to keep them constantly filled. Large spaces need a high level of management and ongoing programming.

"We are often tempted to add 10 metres just to be sure, make things a bit bigger just to be sure, but if you do that you lose the intimate spaces"

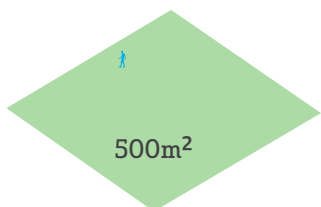
- David Sims Gehl Architects



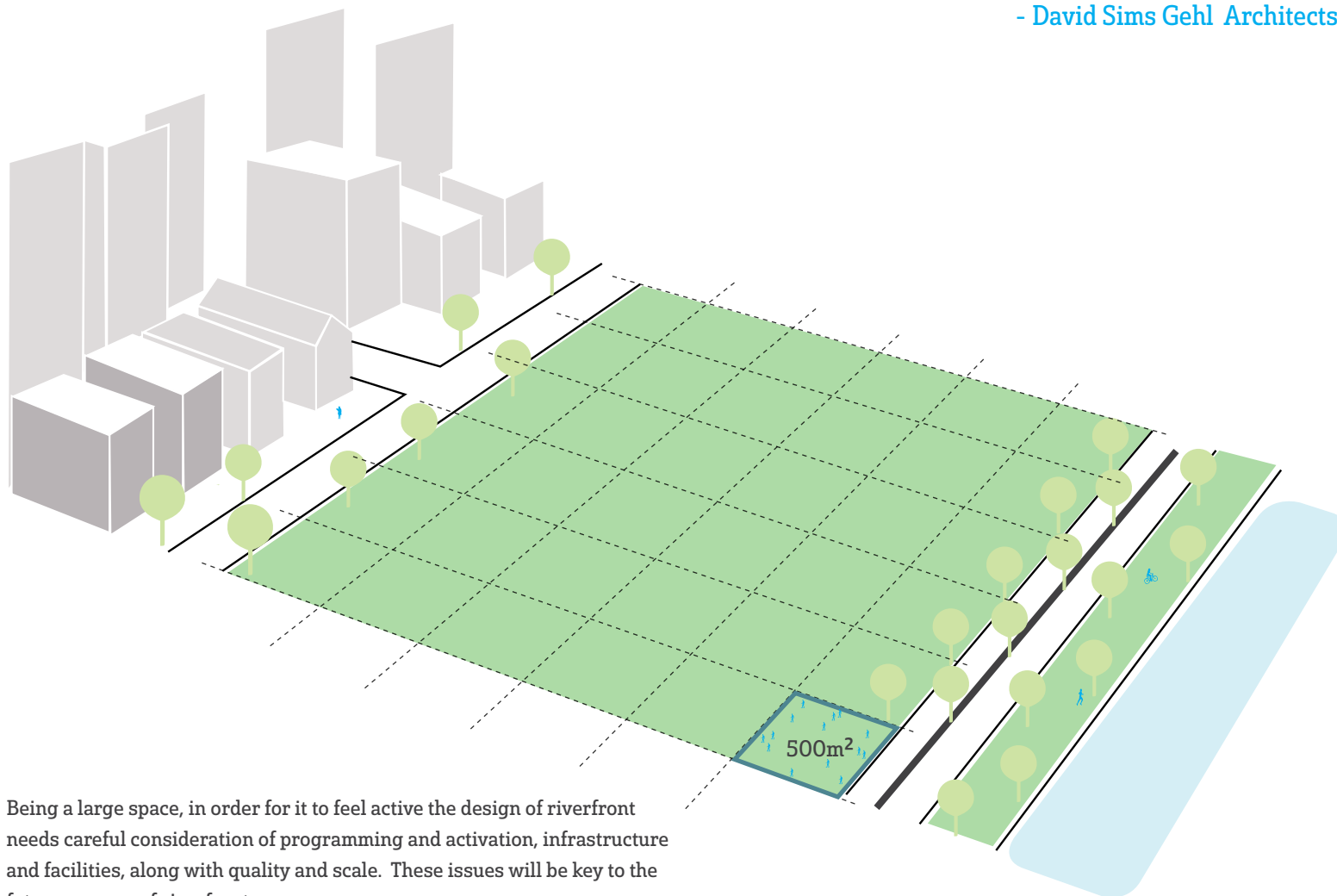
Utilised
more than 10 people/500m²



Occupied
between 1 person to 10 people/500m²



Underutilised
less than 1 person/500m²



Being a large space, in order for it to feel active the design of riverfront needs careful consideration of programming and activation, infrastructure and facilities, along with quality and scale. These issues will be key to the future success of riverfront.

Place

Sense of safety

Improving perceptions of safety

Successful public spaces help people feel secure when they are using them.

The public realm feels safest when it is active during the day and at night, with many and diverse people around. The presence of others, of different gender, socio-economic and cultural background and age, particularly children and elderly, can positively impact the perception of safety for all visitors.

While the presence of police may make some users feel safe, it may discourage others and set a negative tone of surveillance (Macdonald 2018). Open sight-lines within, to and from the site (to see and be seen) also create a sense of safety (Macdonald 2018).

Passive surveillance from people in buildings overlooking the site play a lesser but important role. People's contact with the street diminishes above the fifth storey and beyond this level it is difficult to see, recognise or communicate with people at the ground level (Gehl 2010).

A mix of adjacent buildings that are occupied both day and night provide the best level of passive surveillance. Good lighting also improves people's perceptions of safety and comfort.

Some factors that currently have an impact on perceptions of safety at riverfront are as follows.

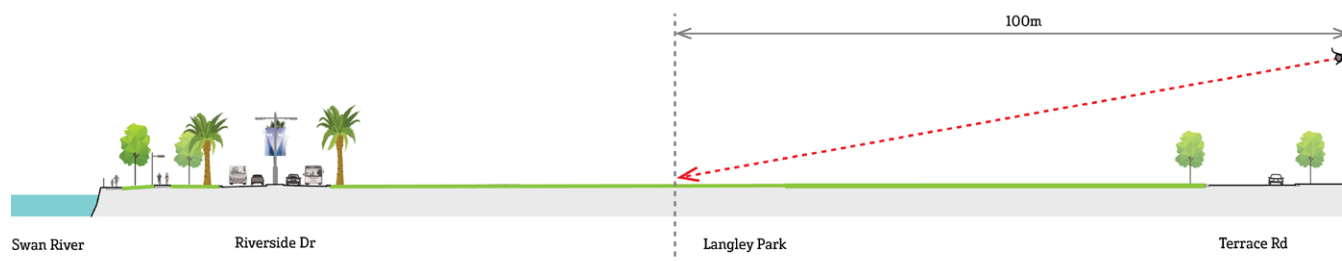
- Many people pass through the riverfront, however only a small proportion stay.
- While there are a lot of high-rise residential properties overlooking riverfront, they are set back at least 180m from the water's edge. Passive surveillance is therefore limited to the northern edges of Langley Park.
- There is limited CCTV coverage of areas adjacent to the water.
- There is some crime and antisocial behaviour at Ozone Reserve.

Public lighting

There are a number of issues with riverfront lighting which are summarised below.

- There is a lack of continuity of lighting around the river. Some sections have no lighting at all, some are lit from road lighting and some have dedicated pedestrian lighting.
- The lighting experience is inconsistent with regard to infrastructure, colour temperature and light type
- Little consideration is given to lighting to enhance the night time environment (e.g. lighting of artworks or landmarks).
- The cycle path along Riverside Drive is reliant on spill lighting from the road.

Future lighting of riverfront must consider the impact of lighting on flora and fauna.



Large distances between the buildings on Terrace Road and the water's edge limit passive surveillance of riverfront.



Place

Microclimate

Protecting users from unpleasant aspects of the local climate, including excessive heat and windy conditions, is important in creating an inviting environment at riverfront. Some key issues to be considered include:

Urban cooling

- Thermal imaging studies undertaken for the preparation of the City's Urban Forest Plan indicate that riverfront (with the exception of the large surface carpark) is one of the coolest areas in the city.
- As the overall level of tree canopy cover is low this is most likely due to its proximity to the water and its irrigated natural surfaces.

Shade

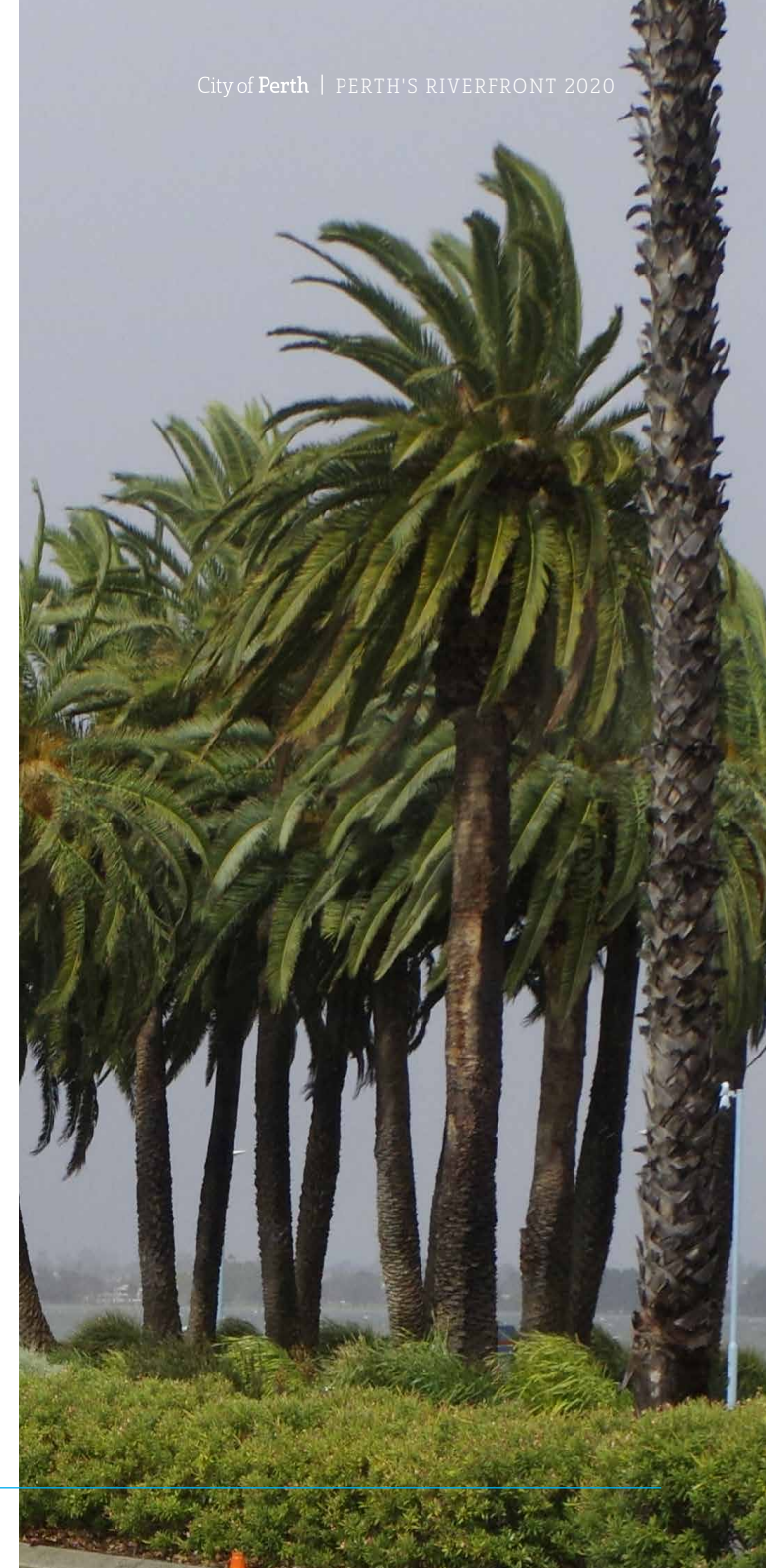
- During summer months a lack of shade and high levels of sun exposure can create a hostile environment.
- Additional tree planting can help to introduce some much needed shade along with a range of other benefits.

Wind

Perth can lay claim to being the windiest city in Australia.

- Unlike the South Perth foreshore, that is protected by landmass, Perth riverfront faces south and receives prevailing south westerly winds.
- While afternoon winds provide the city with relief after a hot summer's day, these winds can also create an uncomfortable environment for users at other times of the day and year.
- The open nature of much of the riverfront means that users are currently offered little shelter and wind protection

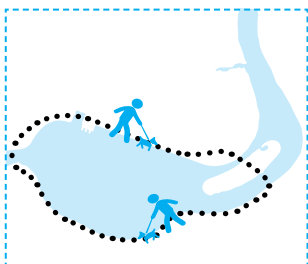
These conditions can have a negative impact on the attractiveness of activities at riverfront particularly for people sitting and staying in the space.



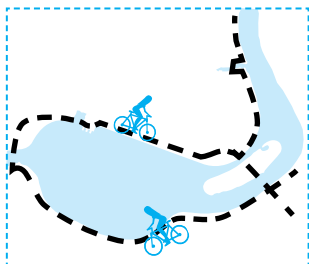


Movement

Strengths (things to build on)



Riverfront walk/loop -
bridge to bridge walk

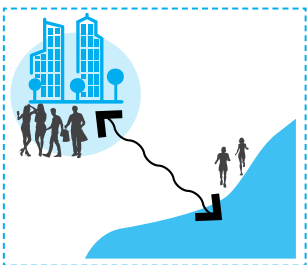


Bike links

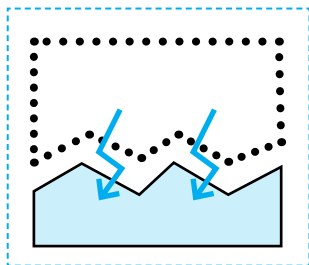


Western end serviced by
ferry, train and bus

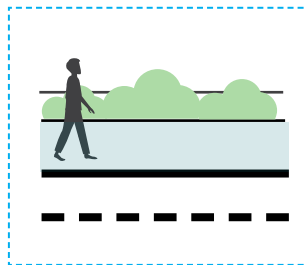
Challenges



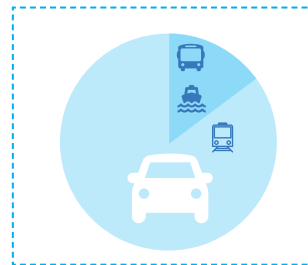
Poor connections to the city



Lack of integration with the
river



Long and monotonous
walking distances



Limited public transport
service

Movement Connection

How movement enables public life

An active, vital public life is closely linked to the quality of people's movement choices, with great pedestrian environments strengthening public life.

Public spaces should be both convenient to get to and from and easy to move through. People should feel as safe and comfortable walking and cycling as they do driving. Some key design considerations are to:

- create good connections to the city's overall movement network
- protect fine grain environments - offer alternative routes and make walking trips more direct, interesting and productive with small size, permeable urban blocks
- scale streets to the pedestrian - streets should be short and relatively narrow with clear lines of sight. Buildings, trees and other streetscape elements are then closer to pedestrians and cyclists as they travel.
- slow vehicle speeds at crossing points with tighter turns and narrower lanes
- make crossings safer with minimised crossing distances
- design footpaths to be accessible to all - unobstructed, continuous, shaded in summer, sunny in winter and well lit at night.



Movement

Connection

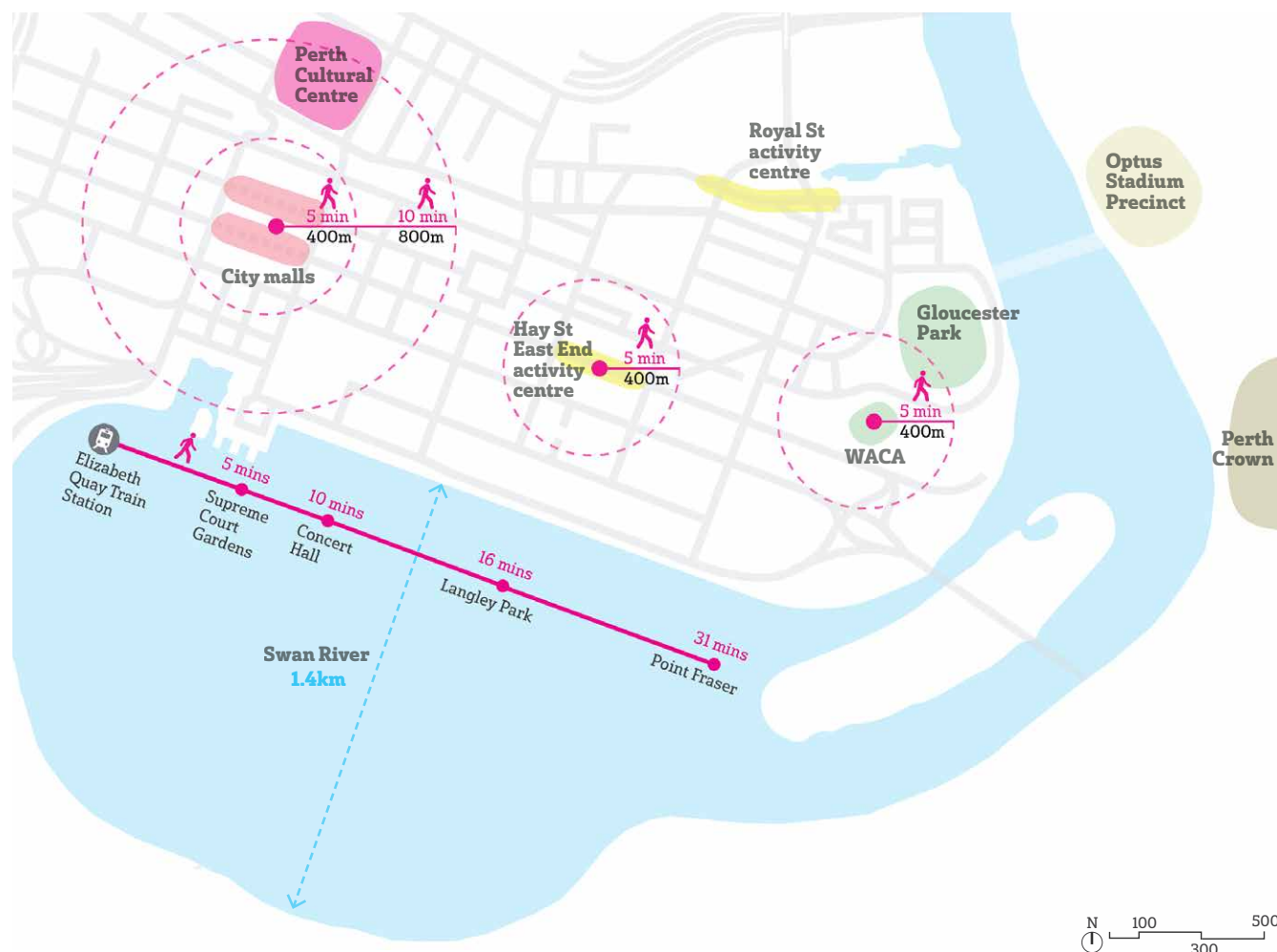
The riverfront is characterised by long walking distances, both to and through the space.

Long distances to riverfront

- Riverfront is located outside a comfortable walking distance of many of the city's major regional attractions (Cultural Precinct, Malls, Northbridge, WACA, Gloucester Park, Perth Stadium)
- Perth Water is 1.4 km wide at its widest point, limiting connection between the river's north and south banks.
- If people are to be encouraged to visit riverfront from other city destinations, a good movement network is essential.

Long distances between riverfront destinations

- There are long walking distances between Riverfront destinations, with limited landmarks or activity nodes which can help to break up the journey and draw people to and through the space.
- The size and lack of enclosure that characterises much of the open space along riverfront creates an uncomfortable sense of exposure and disorientation.
- Many of the buildings do not have active frontages and Langley Park offers little stimulation or variety along its length. This lack of visual interest and stimulation can make walking distances feel much longer.



Riverfront distances

Movement

Connection

Riverfront is poorly connected to the city in terms of pedestrian links. Links to the water are unclear and uninviting in some instances.

Barriers

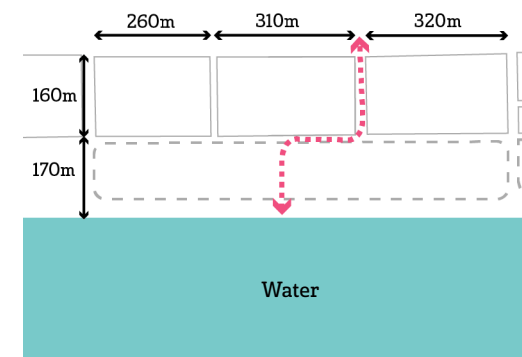
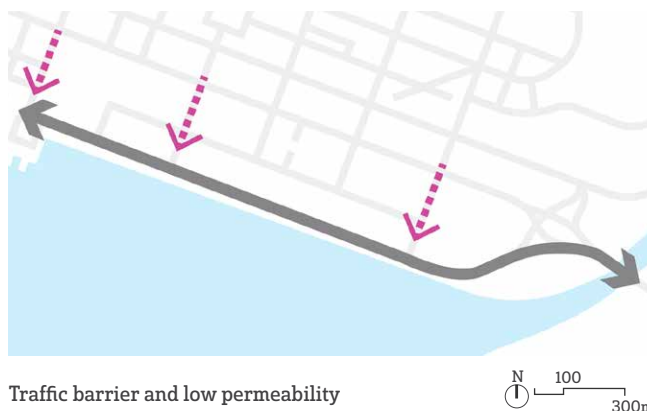
- Traffic on Riverside Drive creates a barrier between riverfront parklands (Supreme Court Gardens and Langley Park) and the river edge.
- Traffic on Riverside Drive and Barrack Street creates barriers for pedestrians travelling along Geoffrey Bolton Avenue, Elizabeth Quay to Supreme Court Gardens
- The large surface carpark east of Governors Avenue compounds this effect by creating a barrier between Supreme Court Gardens and Langley Park
- The width of Langley Park (equivalent of an AFL football pitch) creates a barrier for pedestrians accessing the river's edge from the eastern end of the city.
- Improvements are needed from a disability access and inclusion perspective to ensure that riverfront is welcoming and inclusive for people of all abilities.

Low permeability

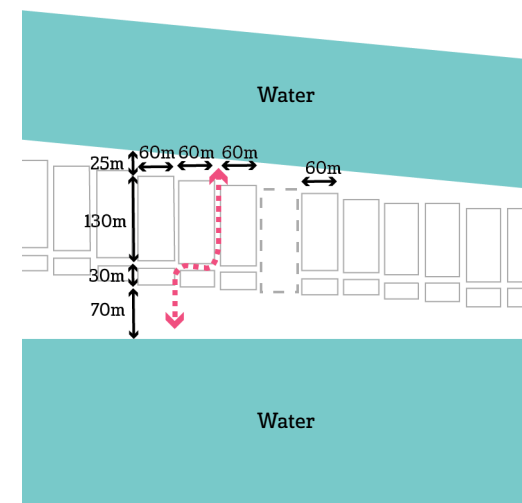
The urban structure surrounding riverfront is characterised by large urban blocks. The average block length is 360m, with the shortest length being 265m and the longest 550m. This creates long walking distances between the streets that connect the city to the riverfront.

Urban structures with a small to medium block size create a more permeable and walkable environment. The best connected waterfronts have an average distance of approximately 75m between connecting streets, such as Venice Beach, California and Hollywood Beach Florida (Macdonald 2018). Other riverfront cities such as Malmo, Copenhagen, Wellington and New York have narrower urban blocks fronting their riverfront areas, ranging from 70-150m in length.

Perth city's long urban blocks reduce the level of connectivity between the city and the riverfront, making it a difficult place to get to.



Perth Riverfront - large blocks



Hollywood Beachfront - fine grain

Movement

Connection

Quality of connecting streets

The character and quality of the connecting streets does not draw pedestrians down to the water. Most of the streets terminate at Terrace Road and views to the river are compromised because of the distance of these streets, and the adjoining Adelaide Terrace, from the water's edge.



Plain Street

- narrow footpaths
- few street trees
- little visual interest
- discontinuous cycle infrastructure



Bennett Street

- good street trees
- some visual interest & good scale
- terminates at Langley Park



Burt Way

- no shade street trees
- stair only access between Terrace Rd & Adelaide Tce
- some visual interest & human scale
- feels privatised
- terminates at Langley Park



Hill Street

- two large hotels on the corner of Adelaide Tce
- narrow footpaths
- many inactive frontages
- terminates at Langley Park



Victoria Avenue

- high quality street trees
- no cycle infrastructure Terrace Rd - Adelaide Tce
- Adelaide Tce - Terrace Rd character doesn't continue through to the water

Movement

Connection

Riverfront Promenades

Riverfront promenades are both destinations and pathways. The experience of walking or cycling along the river's edge takes precedence over getting from A to B as fast as possible. There is also an element of seeing and being seen.

Promenades should be wide enough to allow people to walk along at a leisurely pace. If they are too narrow the path becomes crowded and walking is slow or halted. If they are too wide the sense of intimacy is lost and it feels like there are not enough people around.

Separating cycle and pedestrian paths with a well defined buffer in between reduces the risk of conflicts and improves both pedestrian and cyclist safety.

Room to walk along riverfront

The riverfront's shared pathway forms part of a regional pedestrian and cycle route that connects the north and south side of the river around Perth water. It is a well used facility and a positive feature of riverfront.

Most cyclists and pedestrians using riverfront travel adjacent to the river along the foreshore paths. The busiest section is found between Barrack Street and Victoria Avenue, with user numbers declining from the west to the east.

Some of the key issues with the design of the existing pathway include:

- the shared pathway is quite narrow in places
- separate pathways are provided only part of the way
- pedestrians have to compete for space with cyclists which can affect their sense of comfort and safety
- bollard lighting does not provide adequate lighting to adjacent footpath surfaces
- sight lines to and from the shared path around Point Fraser are obstructed by tall vegetation
- sight lines are limited where the shared path diverts away from Riverside Drive and under the Causeway Bridge, consequently the area can feel unsafe even during the day.
- the location of Riverside Drive reduces the width of the open space along the river's edge to 50 metres which limits the space available for the shared path



Pedestrians and cyclists



Limited sight lines



Poor lighting

Movement

Public transport

Public transport is an important enabler of public life. In addition to supporting necessary activities, a well designed and people focused public transport network and experience offers opportunities to generate additional optional and social activities. To ensure the riverfront is inclusive, it should be easily accessible by public transport.

Bus and train services

- Riverfront is not well serviced by the train or bus network.
- Train stations are not within walking distance,

requiring visitors to take at least two modes of transport to reach riverfront. This adds to the journey time and is also a psychological barrier to using the riverfront.

- Lack of public transport is a problem particularly for events, and at night, when bus and CAT services reduce in frequency or stop altogether.

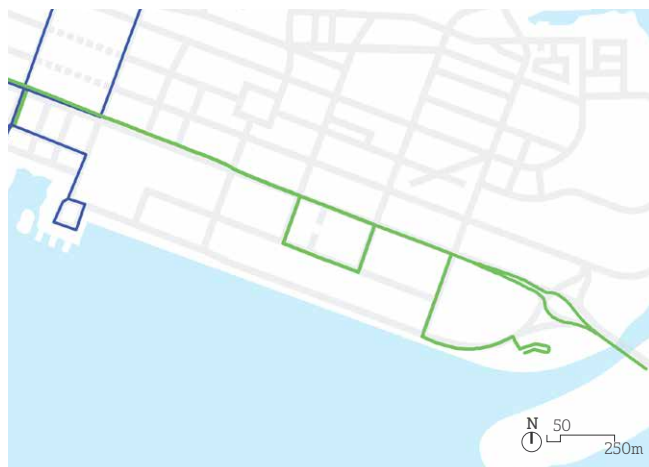
Ferry

- Ferry services are currently limited to the western end of riverfront.
- Greater residential density and additional tourist attractions around riverfront would be required to make an expansion of the existing ferry network viable.

- This would mean meeting the 47% target for metropolitan residential infill, required to drive higher density development in the central area and around activity centres, as set out in the WA Planning Commission's Perth and Peel @ 3.5 million frameworks.

Cycling network

- The riverfront is well serviced by cycle routes, however there are few connections back to the city
- The shared cycle/pedestrian path along riverfront is an important link in the regional cycling network
- There is an opportunity to improve linkages within this network, including a proposal to construct a new pedestrian and cycle bridge across Heirisson Island to Victoria Park due to restricted conditions on the Causeway Bridge.

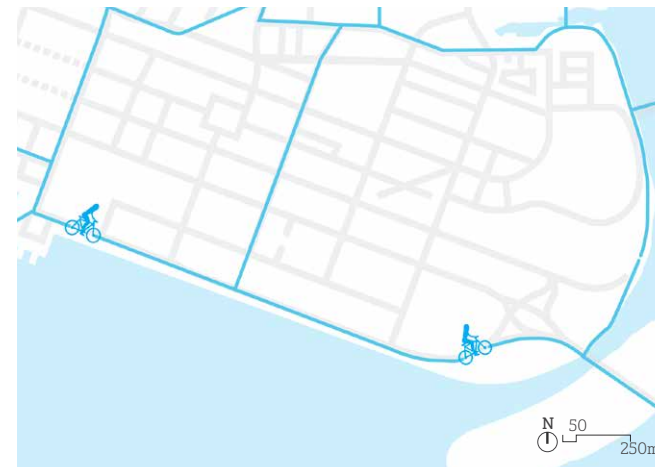


Main bus routes (include Cat Bus) servicing the riverfront



Existing and proposed future ferry services

Source: Department of Transport. 2019. Perth's Ferry Services: Current Status and Future Use.

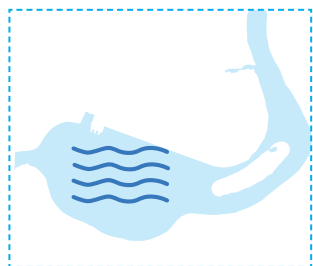


Regional cycling network

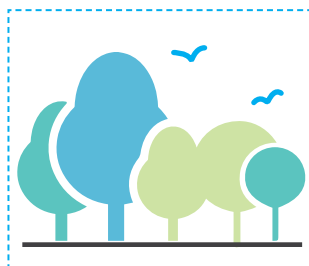


Environment

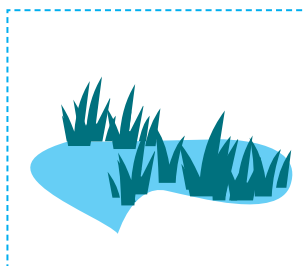
Strengths (things to build on)



Improving water quality



Areas of high biodiversity

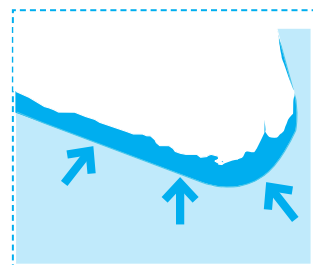


Demonstration wetlands -
Point Fraser

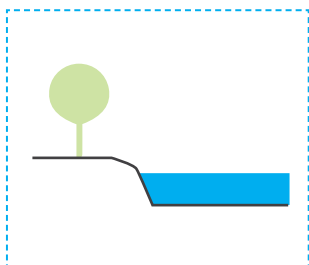


Parkland and waterfront
setting create a cool and
inviting space

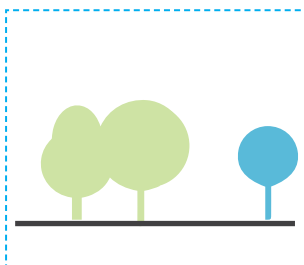
Challenges



Climate change - planning
for increased flooding



Managing the river edge



Areas of low biodiversity
and canopy cover



Maintaining it as an area of
respite on hot summer days



Maintaining current levels
of ground water irrigation

Environment

Riverine environment

Dynamic environments

Rivers are highly complex, living systems. The shape and extent of the river bed and banks can change over time in response to natural processes such as flooding, drought, erosion and sedimentation.

Over the years a range of engineering works have resulted in a number of significant modifications to the Swan River including:

- blasting sections of the riverbed at Fremantle to provide continuous boat access to the Swan Valley
- dredging of approximately seven million cubic meters from the Causeway area to create Heirisson Island and the Causeway Bridge abutments and produce cement and clean sand
- extensive land reclamation which has dramatically shifted the river's shoreline
- within the city, the river's edge has been constructed approximately 190m from the original shoreline.

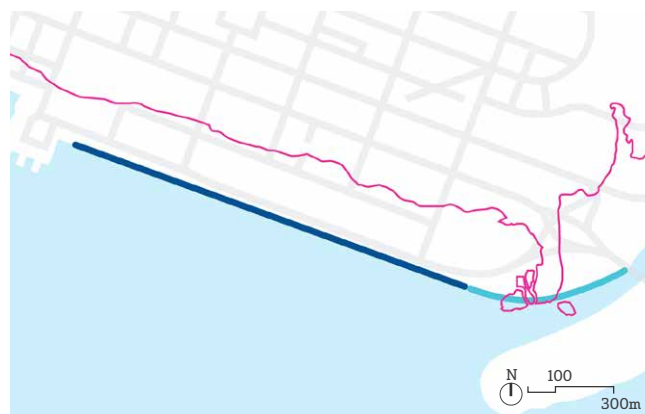
These man-made processes have put the river out of balance, creating issues with the river edge and flooding, which are expected to worsen with the impacts of climate change. They have also had an impact on the river ecosystem and the composition of species living within it.

River edge

The changes to the river's edge means that it requires protection against erosion; the river's natural process to re-establish balance within the river.

Protection

- Most of the river's edge is currently stabilised with a concrete river wall.
- The banks between the river wall and the Causeway Bridge are stabilised with planted gabion mattresses, rock and sand bag revetments and vegetation.



Constructed river edge types & original shoreline

- Concrete river wall
- Stabilised embankments and small beaches
- Original shoreline prior to land reclamation

Condition of river wall

- The river wall is severely dilapidated and the adjacent footpath is at risk of collapsing.
- When the water level rises, storm water discharge outlets in the river wall are submerged. This causes water to flow backwards and city storm water drains overflow.

Over topping

- Waves created during storms and by boats overtop the river wall.
- This contributes to flooding and erosion of the adjacent landscape. The salt water also damages vegetation.



River wall along Riverside Drive

Environment

Flooding

Flooding occurs from local (overland) flooding due to rainfall in local catchments producing runoff, storm tide flooding associated with storm surge or elevated ocean levels, riverine flooding from the Swan River and wind/wave inundation.

- The most frequent source of inundation along riverfront occurs when moderately high water levels coincide with waves causing over topping of foreshore walls associated with westerly storms (Foreshore Flood Risk Mapping and Assessment Project 2019).

- Frequent storm tide events can be contained within the river channel, however, standard and large flood events under different climate scenarios can cause partial and total inundation.
- During the recent storm event (June 2020) there was significant flooding of Riverside Drive and southern sections of Barrack Street, Victoria Avenue and Governors Avenue
- Terrace Road carpark and sections of open space along riverfront, west of Victoria Avenue, were also affected.



50 years flood map



100 years flood map

Impacts of climate change

Changes caused by global warming are expected to have the following impacts on Perth's riverfront:

- more intense and frequent storm events
- higher sea levels causing flooding
- lower rainfall, causing salt water to move further up the river during summer and autumn, impacting the composition of the river ecology (Bolleter, 2015. p. 161).

By 2100, sea levels are expected to rise by 1.1 metre, causing Langley Park and Heirisson Island to be almost completely submerged (Bolleter, 2015. p. 161).



Recent flooding Riverside Drive 2020

Environment

Options for flood management

The Australian Urban Design Research Centre (AUDRC) prepared a report that included an assessment of the possible effects of riverine flooding, storm tides and projected sea level rise (SLR) on riverfront. It proposed and modelled three management options for a SLR of +1.2m and +2.5m by 2100, as follows:

Fortify

Fortification adopts a hard engineering approach using man made structures such as sea walls, embankments and flood barriers to block flood waters. While this can be a commonly accepted approach it has some disadvantages. Works can be expensive and difficult to fund. They can also promote higher levels of development in areas that are essentially at risk of flooding. Should fortifications fail the results can be particularly severe. Given the dynamic nature of rivers fortification in one area can create a new flood risk elsewhere in the catchment.

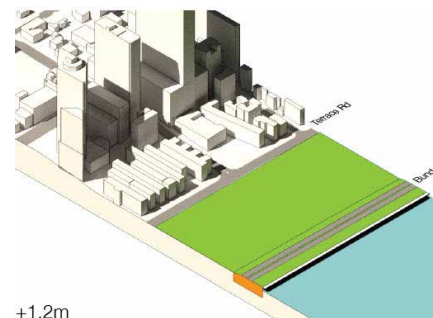
Accommodate

Accept a degree of flooding and design to minimise flood damage. This can include restrictions on land use and the use of soft engineering approaches to increase levels of permeability, water absorption and temporary storage within the landscape. It can also filter water to improve quality. However, this approach can result in restrictions on development which can be controversial.

Retreat

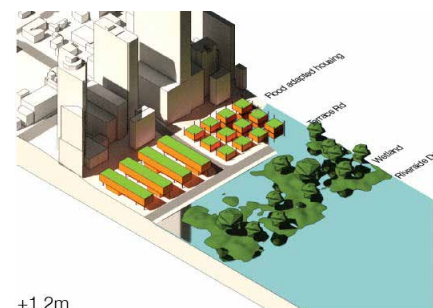
Acknowledge that land will inevitably be lost to flooding and remove all infrastructure to allow the gradual inland movement of water. However, the process of retreat can be difficult to manage and unpopular with the community.

Fortify



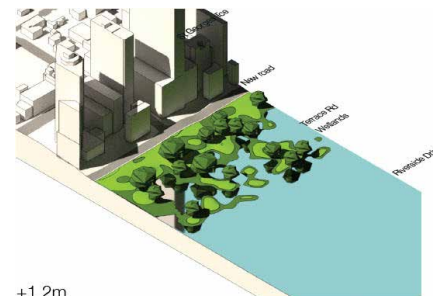
+1.2m

Accommodate

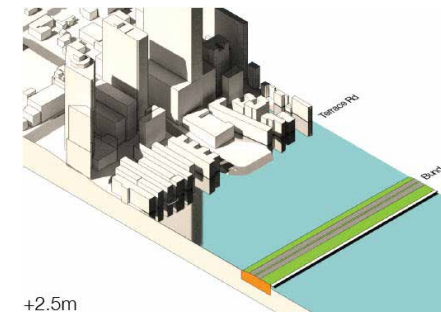


+1.2m

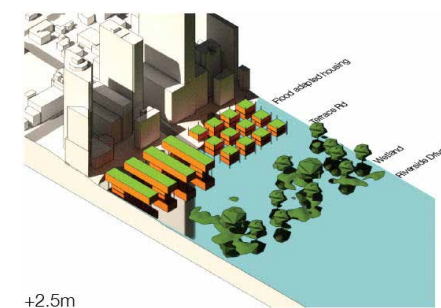
Retreat



+1.2m



+2.5m



+2.5m



+2.5m

Source: *The rising tide: Reconciling Sea Level Rise with the provision of ecosystem services in Perth Water*. AUDRC 2017.

Environment

Water quality

The Swan River is believed to be one of the cleanest rivers in Australia and recent indications are that water quality in the river is improving.

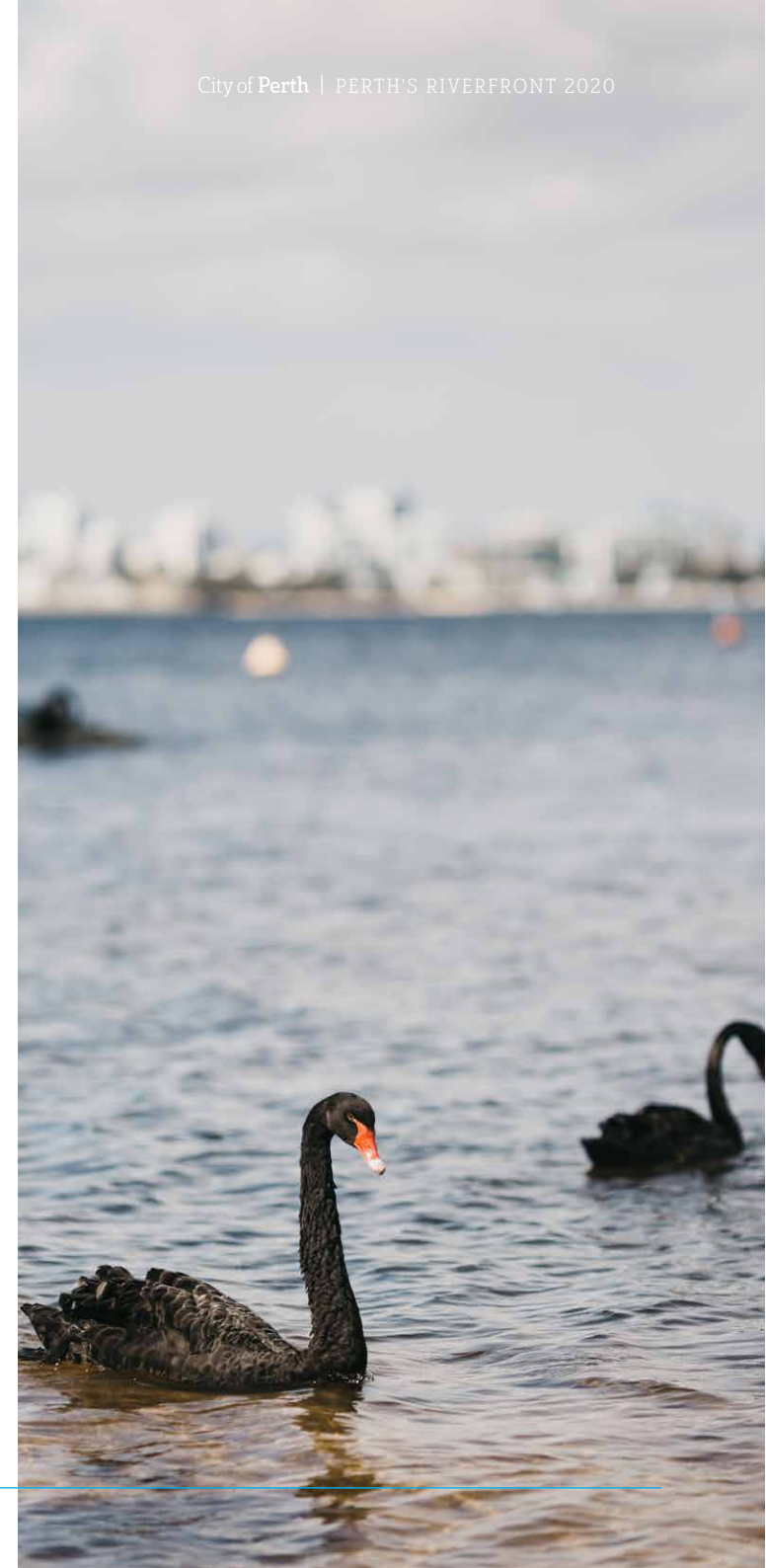
The WA Department of Health monitors microbiological water quality and assigns a beach grade to indicate whether the water is suitable for swimming. The river is currently deemed safe for swimming in many locations, with the water at Point Fraser rated as 'fair'.

Despite this some challenges remain including:

- although algae are a natural part of the river system excess nutrients from soluble fertiliser and animal waste can create nuisance and toxic Alexandrium algal blooms
- blooms cause paralytic shellfish poisoning, making fish and shellfish unsafe for human consumption
- reduction in fresh water and excess fertilizer entering the river has led to a depletion of oxygen levels, leading to poor water quality and fish deaths
- river swimming is not as popular as it once was. There is an annual swimming race from Barrack Street jetty to Matilda Bay in Crawley, however, it is rare to see people swimming outside of this.

Some ameliorating factors include:

- algal blooms will decline when nutrients in the water are depleted and/or environmental conditions, such as light and temperature no longer support algal growth
- constructed wetlands and foreshore planting can extract nutrients such as nitrogen and phosphorus from storm water before it enters groundwater and the river. This improves water quality within the river
- oxygenation plants built in Guildford (2009) and Caversham (2011) to pump oxygen into the Swan River.



Environment

Geology and soils

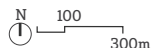
The character and quality of the geology and soils along the riverfront will have environmental and financial implications for future development.

Paleochannel

- There is an ancient river system filled by younger sediment, creating soft ground beneath parts of riverfront.
- Structures built on top of the paleochannel require piling to a depth of 36 metres.

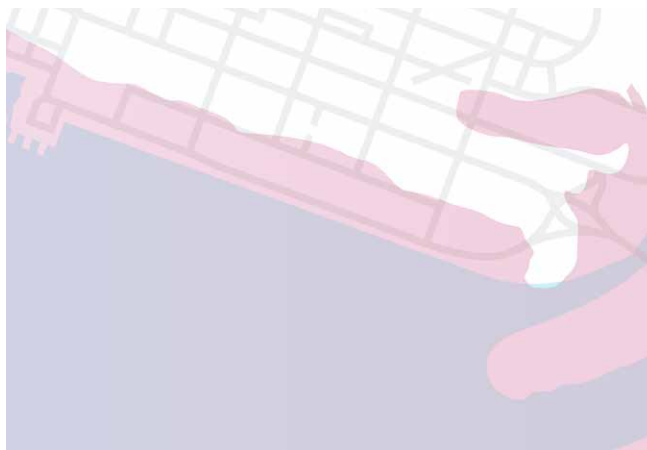


Paleochannel

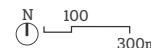


Soil quality

- Acid sulphate soils occur naturally in Western Australia and are relatively harmless when left undisturbed. However, they have the potential to release sulphuric acid and heavy metals into the surrounding environment when exposed to air.
- There is a high to moderate risk of acid sulphate soils across most of riverfront, potentially as shallow as 0.25m. This can be managed but excavation and dewatering should be minimised to limit environmental damage.
- The quality of material used to infill the site during reclamation is unknown and may contain buried objects and contamination.



Acid sulphate soils



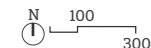
- The naturally occurring subsoil type has a very low strength bearing capacity, increasing costs for foundations and piling.

Shallow water table

- As a result of the reclamation works being undertaken within the river, beyond the original shoreline, the water table is sitting just half a metre or less below ground level.
- Structures constructed below this level would require constant dewatering.



Shallow water table



Environment

Urban Forest

The Urban Forest Plan (2016-2036) promotes the long term health and resilience of the City's street and parkland trees to maximise the delivery of a range of community benefits.

Riverfront street and parkland trees

There are approximately 2035 existing trees planted within the public realm at riverfront. Some particular issues include:

- low canopy cover in Langley Park, which is currently dominated by non-native species
- potential for new tree planting to improve age diversity and contribute to the City's 30% canopy cover target for the public realm.



122 species

Good diversity



13%

Low canopy cover

Biodiversity

The riverfront is part of the Perth Regional Biodiversity Links: a series of non-contiguous natural areas that connect larger natural areas. These links allow the movement of fauna by increasing foraging areas, providing a mosaic of different habitats and refuge from disturbances and predators (WALGA, 2017).

The City's Green Infrastructure and Biodiversity Study (2017) identified a number of riverfront sites as being the city's:

- most flora biodiverse green assets (Supreme Court Gardens, Point Fraser)
- most WA native species flora diverse green assets (Point Fraser, Ozone Park/Lake Vasto)
- top 10 fauna diverse sites (Point Fraser, Ozone Park/Lake Vasto).

The Study made the following recommendations to improve the biodiversity of the riverfront:

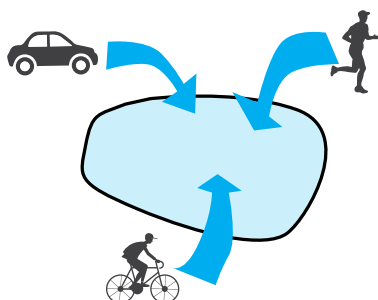
- develop riverfront as a primary biodiversity route, connecting the foreshore with other larger regionally significant biodiversity assets eg. Kings Park and the Bush Forever Areas outside the City, to improve fauna movement, fauna habitat and overall floristic diversity between larger bushland areas and the Swan River
- accommodate more varied landscaping to increase biodiversity
- improve structure of vegetation often required for a more complex fauna assemblage. eg. a linear park along Langley Reserve
- Replace juvenile exotics with natives and remove Palm Trees at Ozone Reserve.



Summary - current character and key issues

Perth's riverfront provides an iconic setting for Western Australia's capital city, however, its potential to develop as a world class destination is not fully realised at present. The current character of the riverfront can be summarised as follows:

Uni-dimensional space



- limited and primarily recreational focus
- lack of diverse activities
- inadequate supporting infrastructure
- prevailing winds can create a hostile environment

No visibility of cultural heritage



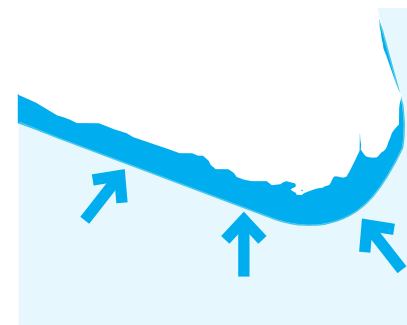
- lack of acknowledgment of significance to Whadjuk Nyoongar people
- limited expression of other history
- opportunities for cultural collaboration

Disconnected from the city



- lack of human scale
- large distances with little interest
- weak physical and visual links
- no relationship with adjacent land uses

Environmental challenges



- badly degraded river edge
- low biodiversity at Langley Park
- dynamic and complex riverine environment
- susceptibility to frequent flooding, now and in the future
- risks to water quality and ecology as droughts increase and salt water moves upstream

A young girl with long, curly brown hair is running across a large, green grassy field. She is wearing a white sleeveless dress, white leggings, and brown sneakers. Her hair is blowing in the wind, and she has a joyful expression. In the background, there is a line of trees and a city skyline with several tall buildings under a clear blue sky. The scene is brightly lit, suggesting a sunny day.

Perth's riverfront
future opportunities

Previous plans for riverfront

City riverfronts are dynamic environments that change and evolve as their cities develop and adapt to ongoing environmental, social and economic challenges, opportunities and innovations.

In recent years many cities have been assessing and redesigning their riverfronts to harness their potential to improve overall livability and resilience in the face of challenges created by changing urban lifestyles and functions, increasing urbanisation and the impact of climate change.

Over the years many plans have been produced for Perth's riverfront reflecting changing attitudes as the city has evolved. These have been documented by Julian Bolleter in his text *Take me to the River: The story of Perth's Foreshore* (2015).

In this part of the report the most important of these plans have been reviewed and organised under the following key themes to extract design ideas that remain relevant to Perth's riverfront today:

1930's - City Beautiful

1990's - A city in a garden setting

2000's - The city meets the river

This is followed by a series of case studies that showcase current international trends that are influencing contemporary riverfront design; as a precursor to suggested design opportunities for the future of Perth's riverfront.



City beautiful

Plans for the newly reclaimed riverfront were influenced by the City Beautiful and Garden City movements of the late nineteenth and early twentieth centuries.

Mass urbanisation leading to poor sanitation gave rise to the idea that city's were unhealthy and the natural landscape could provide a remedy to city living ailments and promote social order. As a result, city parks were developed in a style that mimicked a romanticised version of the natural landscape.

For Perth at this time, rather than the indigenous landscape, the gardens and agricultural land of Europe provided the aspirational model for parks such as the river foreshore.

John Oldham Perth Foreshore Plans

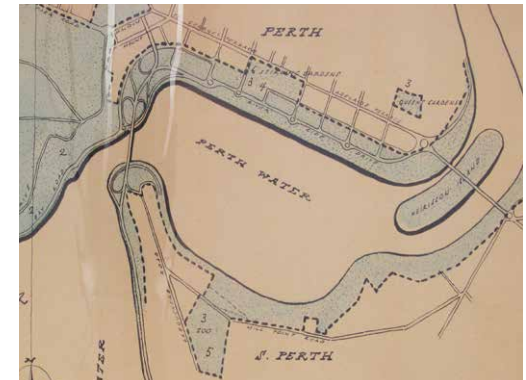
Landscape architect John Oldham produced two designs for the foreshore that have had a significant influence on future plans for riverfront.

Key themes and design ideas

- an enormous riverside botanic garden from Matilda Bay to the zoological gardens in South Perth (1957)
- a more modest plan that included passive recreation spaces, event/performance spaces and sandy beaches and Riverside Drive rerouted to the urban edge of the city (1978).

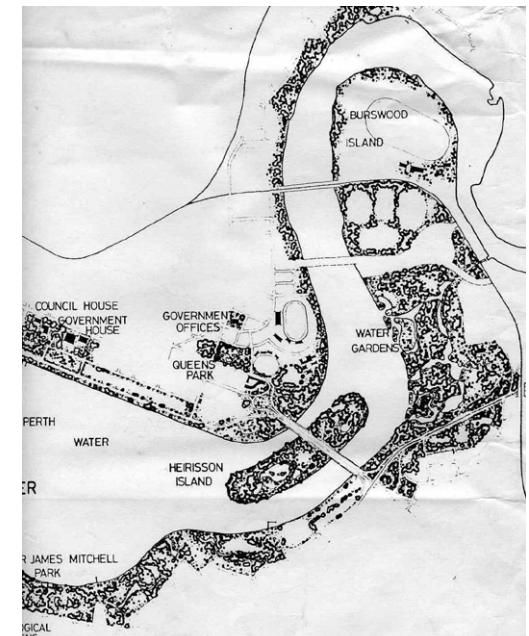
Why the plans were not realised

- plans were partially realised, with John Oldham Park constructed around the Narrows Interchange, and Kings Park botanic garden
- cost and administration were cited as possible obstacles to the development of the botanic gardens.



John Oldham Plan 1957

Source: Courtesy of J Bolleter - not for external publication



John Oldham Plan for Perth Water 1978

Source: Courtesy of J Bolleter - not for external publication

Molyneux Plan (1980's)

The Molyneux Plan strikes a balance between urban development and naturalisation of the river foreshore.

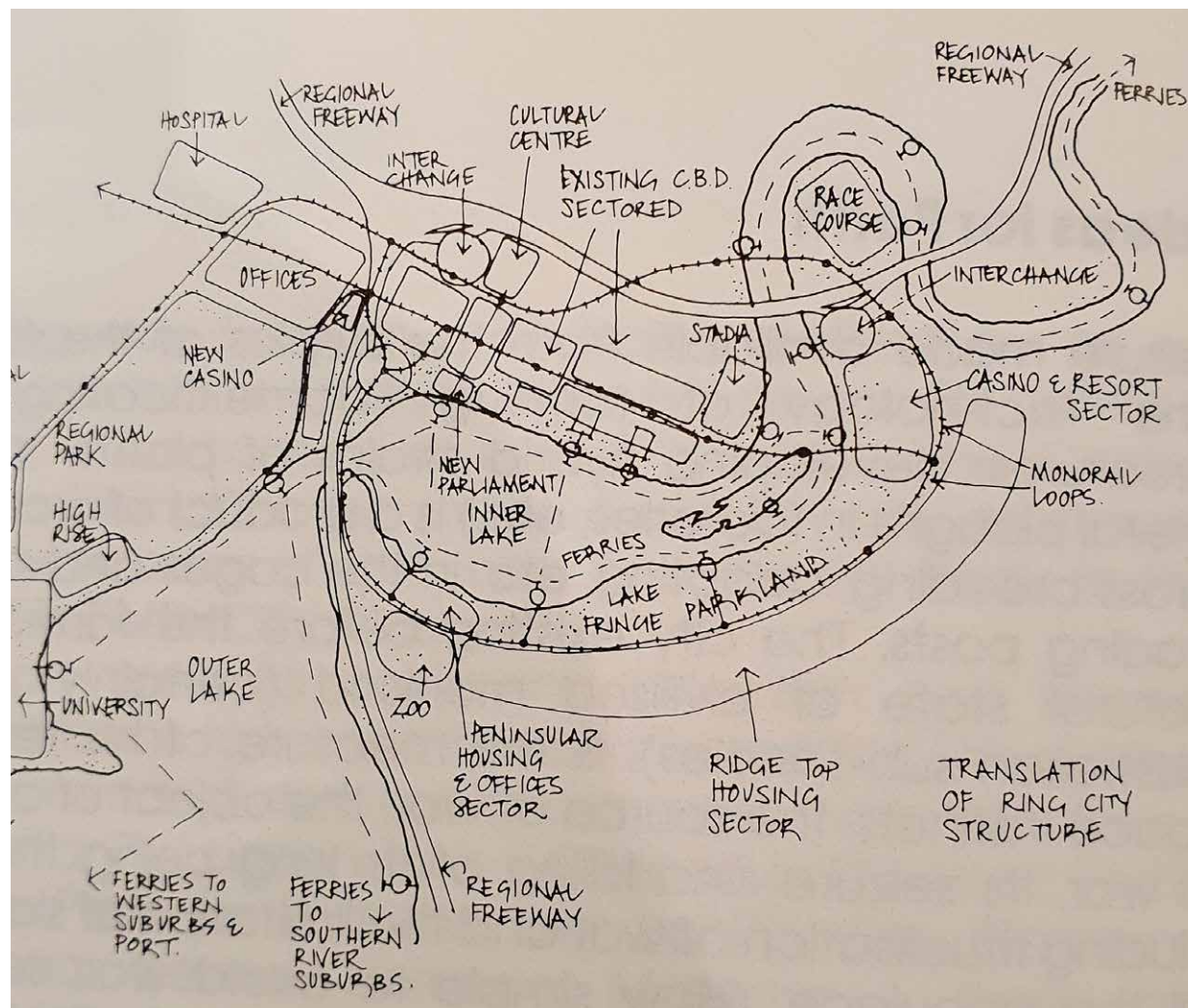
Key themes and design ideas

Key features of the Molyneux plan included:

- high-density activity nodes structured around stops for a high speed ferry service, bringing the river to the city and the city to the river in an unintrusive way
- potential for urban development to fund expensive infrastructure required to protect existing buildings and infrastructure from future rising sea levels along with other public amenity.
- high-density housing on the waterfront may also be more successful in competing with the suburbs and meeting the City's population targets.
- important cultural institutions are relocated to the water's edge, signifying the importance of the river to the city
- set within an urban forest enveloping Perth Water.

Why the plan was not realised

- the design was developed as a speculative opinion piece rather than a formal plan.



Molyneux Plan

Source: Molyneux, Ian. 1986. "Ideas for Perth". *The Architect*, No. 4: 16-18

A city in a garden setting

In 1991 the City of Perth implemented the Perth Foreshore International Urban Design competition.

The brief was based on a desire to reconnect the river to the city with a landscaped-based solution. This reflected the community's aspirations at the time for a garden setting for the city, and a movement to recreate the original river landscape to define a unique sense of place for Perth.

Over ** submissions were received from a range of local, national and international entrants. The majority were dominated by proposals that positioned the riverfront as an escape from the city. They also sought to develop Perth's unique sense of place, by recreating the indigenous landscape and referencing (unfortunately often in a superficial way) the indigenous culture.

Waterside Perth (1991)

The winning competition submission was a naturalistic design by North American firm Carr, Lynch, Hack and Sandell. While mostly popular with the public, the scheme was criticised for ignoring the urban context, not providing enough opportunities to interact with the river, consequently failing to reconnect the city with the river.

Key themes and design ideas

- reinstatement of endemic planting and fauna habitat
- expressing the original shoreline and bringing the river closer to the city with a man-made creek
- a large curved jetty to provide views back towards the city from the water
- renewal of Barrack Street Square as a boating hub.

Why the plan was not realised

- multiple authorities responsible for the various parcels of foreshore land hindered the project initiation
- a low residential population in the city meant that the park wouldn't be very active outside events. Therefore the project was not attractive to private investors and would have had to be entirely publicly funded at a time where local and state government spending was limited.
- ultimately a change in state government from Labor to the Liberal-National Party saw the plan abandoned.



Waterside Perth 1991

Source: Carr, Lynch, Hack and Sandell Architects

The city meets the river

In the early 21st century, Perth began embracing the urban nature of the city. A shift in trade towards China and India positioned Perth to take advantage of its geographic centrality, and it began to see itself as a globally connected, 'real' city rather than an overgrown town (Bolleter, 2015).

Plans for a new Perth to Mandurah rail line focused local and state government attention on the Esplanade where the line would enter the city. The state government sought proposals from architect-led teams, signifying a departure from earlier landscape schemes.

This approach resulted in a built-form driven scheme that brought the city to the river: a complete urbanisation of the Esplanade.

Circle Scheme (2008)

Melbourne based architectural practice ARM and local landscape architect Richard Weller were selected by the state government to develop designs for Elizabeth Quay.

Key themes and design ideas

The consultants produced a bold urban scheme featuring a:

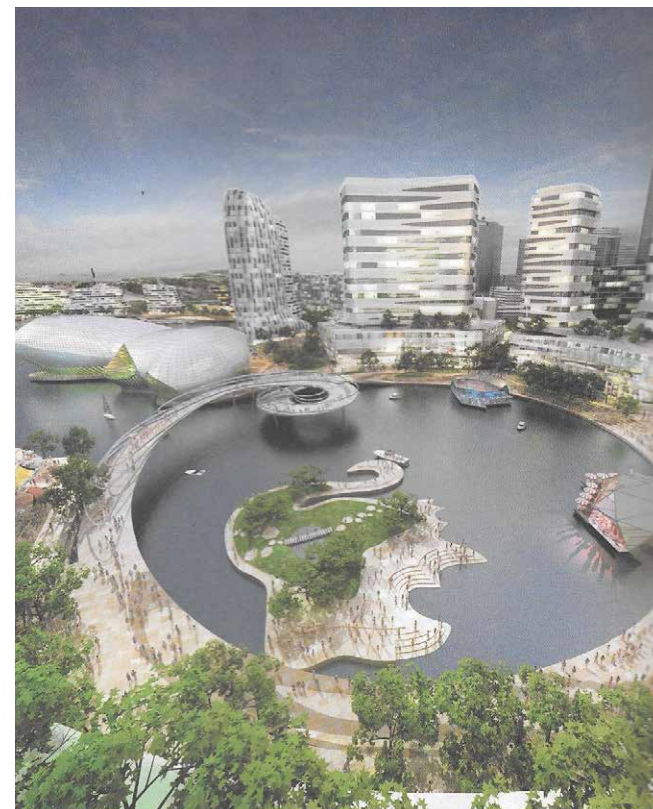
- north-south spine connecting the city core and central train station to the river
- circular inlet
- urban public square
- Indigenous Cultural Centre.

Why the plan wasn't realised

Although initially popular it was increasingly criticised as:

- soulless and lacking a connection to place.
- reflective of contemporary Dubai waterfront developments including international 'starchitecture' style buildings and a swan-shaped island that could only be appreciated as such from an aerial perspective
- privatising the foreshore with dense urban development
- having a built form characterised by high rise buildings towering over the public realm, losing all sense of human scale and creating uncomfortable spaces.

The controversial scheme was abandoned after the Labour party lost the state government election in 2008. The newly elected Liberal state government retained the consultant team asking them to come up with new, more modest scheme.



Circle Scheme 2008

Source: Take me to the river. J Bolleter - not for external publication

Elizabeth Quay (2010)

A new design based on a rectangular inlet was developed and publicised in 2010.

The development still proposed tall buildings (up to 36 storeys), however their form stepped down towards the water's edge. Overall it was more in keeping with established Australian waterfront developments, such as Circular Quay and Melbourne Docklands (Bolleter, 2015).

Key themes and design ideas

- retention of the north-south spine and urban approach of the Circle Scheme
- rerouting of Riverside Drive away from the water's edge
- a shared pedestrian and vehicular zone which can be closed for events
- waterside terraces providing informal seating for events
- a water playground
- a garden island for passive recreation.

How the plans were realised

To finally get something built on a contested site that has seen many unrealised plans took more than a good design. Factors for success included a:

- project champion with significant political influence (ministerial and state premier support)
- shared purpose and vision among all planning bodies with authority over the Perth foreshore. This was achieved by establishing the Perth Waterfront Taskforce.
- great deal of luck was involved in managing to continue the project despite the change in government.

(Bolleter, 2015. p140).



Elizabeth Quay 2017

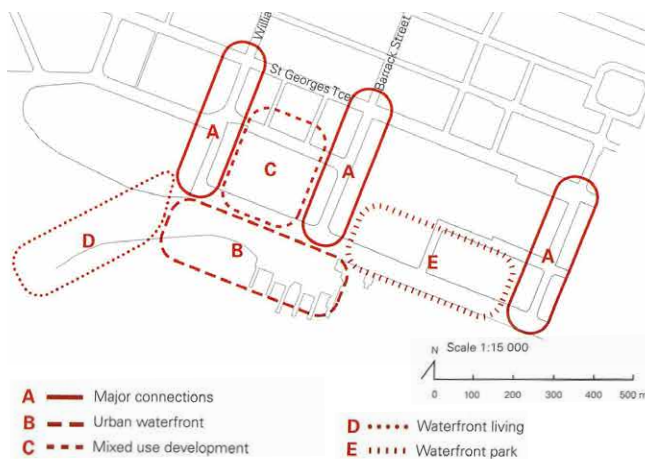
Source: Metropolitan Redevelopment Authority (Development WA website)

Perth 2009 Public Spaces and Public Life - Gehl Architects

The purpose of this study was to analyse public life conditions within the city centre, to measure it against Gehl's earlier 1991 study and make recommendations for future improvements. The study area included the western section of Perth's riverfront only - the area between William Street and Victoria Avenue.

The study recognises Perth's magnificent setting by the Swan River and Kings Park but notes that the potential of these assets is not being fully explored, with riverfront remaining as a hidden treasure. It recommends that it is developed as Perth's main destination, with districts of differing character.

The Gehl study is notable for its focus on developing an urban quality to riverfront in addition to its landscape qualities.



Create a waterfront with districts with different characters

Specific recommendations included:

- strengthening visual and physical links between the city and the water by establishing continuous high quality walking links. Riverside Drive should be developed into a pedestrian friendly boulevard that is easy to cross.
- creating an urban waterfront promenade and providing public access along the entire riverfront
- offering people different ways to physically experience the water by creating a varied edge and considering viewpoints, jetties, hardscaped edges, soft natural edges, stairs, islands, floating elements, inlets, canals, bridges and boats
- offering a wide range of spaces - distinct urban spaces, green spaces, local spaces, large spaces and intimate spaces;
- each space should be designed as a destination in itself - clearly defined, dimensioned to the human scale and making the most of positive climatic conditions.
- providing diverse activities for different user groups
- uses should supplement the city centre so that riverfront becomes a valuable extension to the city
- creating spaces that are inviting both day and night and all year round
- incorporating active ground floor functions and transparent frontages to create a stimulating people environment
- developing in stages to capture lessons learned.

Life - Space - Buildings

Gehl proposes the following approach to developing the western part of riverfront:

Life - a vision for public life must be the foundation for planning - who are the potential users, which activities could be developed, what kind of life can take place.

Space - public spaces are developed and designed to accommodate and encourage the activities that are envisaged. They are planned according to desirelines, destinations and user groups.

Buildings - the placement and quality of buildings should be treated in relation to space and life so that functions and activities can be connected and mutually supportive.

Life



Space



Buildings



Source: Gehl Architects

What If? Schemes (2010)

In 2010 the City of Perth called for creative ideas expanding upon the Urban Design Framework (2010), the City's blueprint for development to 2029. From these ideas, ten firms were commissioned to develop a project each. Three schemes presented proposals to transform Perth's riverfront.

Langley Park (Urbis)

Key themes and design ideas

- buildings and gardens built on 'skybridges'
- large outdoor event space attractive western end
- smaller event spaces further east
- retail, cafe and public facility buildings adjacent the main outdoor event space
- a public pool and water play facility
- a narrower (50m) undulating Langley Park for informal active recreation
- a pedestrian and transit (light rail or tram) loop connecting major tourist attractions and the city and South Perth foreshores
- new headlands on the north and south banks and an island to facilitate bridges over the river
- features to shelter public spaces from strong south-westerly winds including large screens on the water's edge and rotatable buildings
- wind turbines, photovoltaic panels and lighting.



What if? Langley Park - Urbis

Source: *What if? Ideas for the City of Perth*. City of Perth 2010

Strengths

- regional and local destinations to attract a wide range of people during the day and at night
- continuous pedestrian and cycle movement around Perth Water
- improved public transport access to the whole Perth Water foreshore
- topographic variation in the landscape to define space, create interest and protect from wind and flooding
- eastern city gateway defined with new built form on Adelaide Terrace.

Weaknesses

- lacks major national or international attractions
- Nyoongar culture represented through integrated artwork but no opportunities for meaningful cultural engagement
- a highly contrived river edge design detrimental to the river ecosystem
- a somewhat weak and tokenistic sense of place - small selection of historic events and landscape features represented
- skybridges likely to create privatised spaces above and shadowy, unwelcoming spaces below
- would require extensive excavation of acid-sulphate soils
- sub-surface structures would require constant dewatering.

Green City

Hassell and AECOM investigated climate change, alternative energy, built form and greening solutions to transform Perth in to a sustainable city by 2050.

Key themes and design ideas

- city's river foreshore as a continuous, green, productive landscape
- wetlands to filter nutrients from city stormwater before discharging in to the river
- urban agriculture and community markets to supply local residents with fresh produce
- medium density residential / commercial / retail / cultural city "green" connectors extending from city streets out over the river
- a tidal river edge to accommodate future sea level rises
- wind turbines in the river to supply energy to the city
- an expanded ferry service and a new train line to service the area
- a centre for urban agriculture at Heirisson Island.



What if? Green City- Hassell with AECOM

Source: What if? Ideas for the City of Perth. City of Perth 2010

Strengths

- aims to derive maximum benefit from the land
- connects to broader ecological networks and creates habitat, although urban agriculture may conflict
- integrates the riverfront with the city on many levels
- improves public transport access
- provides amenity for local residents
- city connectors provide activation.

Weaknesses

- lacks major national or international attractions, although innovative technologies may potentially be a tourist attraction if showcased
- does not address sense of place or cultural heritage
- building city connectors into the river would have negative impacts on the river ecology.

Populate Perth

Woods Bagot's scheme aims to triple the city's population while simultaneously creating 'Australia's most sustainable city'. They examined where, how and in what form additional housing might be created.

Key themes and design ideas

- housing 2,400 new residents in a series of mid- to high-end exemplary 'Net Zero Emission Building' residential towers along Terrace Road
- retaining the same net area of public green space at Langley Park, while introducing more native vegetation to improve biodiversity
- introducing constructed wetlands to filter storm water before discharging or recycling it.

Constructed Wetlands

- Create a balance of recreational and native vegetation
- Store and release water into the river or recycle
- Enhance biodiversity

Public Open Space

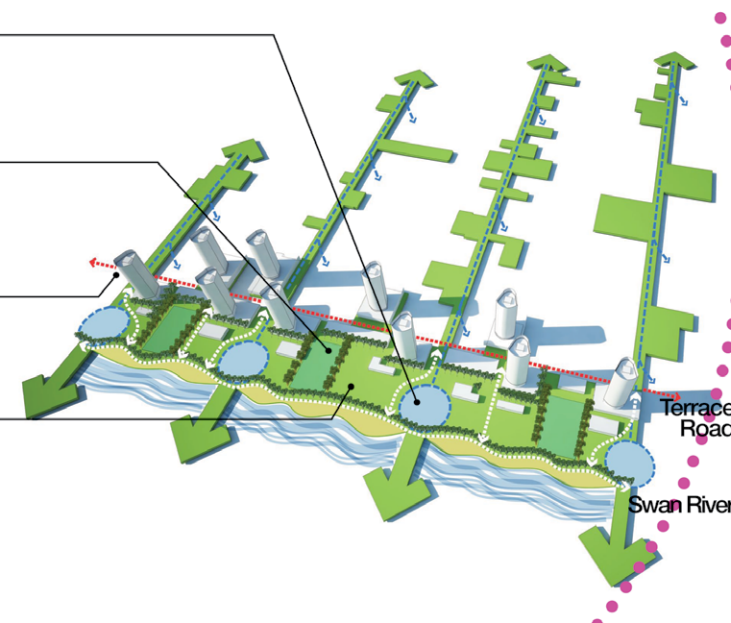
- Reconnect public open space to the river's edge
- No net loss of public green space
- Park serves as eco-infrastructure and creates habitat

Terrace Road

- A residential and recreation address
- Perth's cutting edge for sustainable living
- Outdoor event and recreation centre

Langley Park

A series of exemplary 'Net Zero Emission Building' residential towers and related community space anchor the Eco Corridor at Langley Park. Mid to high end residential flats with public amenities and place making elements enliven and populate the waterfront and Langley Park.



What if? Populate Perth - Woods Bagot

Source: What if? Ideas for the City of Perth. City of Perth 2010

Strengths

- aims to reinforce and improve existing Terrace Road urban fabric
- creates a critical mass of residents adjacent the foreshore that could support bigger and more varied services and amenity
- retains open space to support high-rise residential living
- creates connections with broader ecological networks.

Weaknesses

- does not address public transport access
- mid- to high-end residential could impact the diversity of riverfront users
- does not introduce attractions or destinations to encourage activity on the riverfront
- does not address sense of place or cultural heritage.

Current global trends for riverfront cities

International riverfront examples:



Image Source: <https://www.wellingtonnz.com> Accessed 14/07/20

*Acknowledging Maori culture and traditions
Taranaki Wharf West, Wellington Waterfront, NZ
Completed 2011*



Image Source: <https://landezine-award.com/aalborg-waterfront/> Accessed 14/07/20

*Providing diverse activities
Aalborg Waterfront, Aalborg, Denmark
Completed 2012*



Image Source: <https://www.architonic.com/> Accessed 14/07/20

*Newly re-introduced wetlands
Hunter's Point South Park, Phase II, New York
Completed 2018*



Image Source: <https://www.theguardian.com/cities> Accessed 14/07/20

*Paris Plunge - a temporary floating pool installed as
part of annual Paris Plage summer festival
Paris, France,
First opened 2017*

Indigenous culture

- acknowledge traditions
- interpret meaning
- create opportunities

People focus

- diverse range of activities
- balance of active and passive
- connect people to the water
- improve access for all users
- night and day activity

Ecological focus

- restorative landscapes
- climate resilience
- provide access to nature

Urban plunge movement

- active engagement with the river
- unique urban experience
- increase awareness of storm water pollution and river health
- improve water quality for recreation

Case studies

Indigenous culture

Given their geographical location and features riverfronts were frequently the sites of early human settlement and city development. This rich cultural history, particularly that of indigenous cultures, is increasingly being recognised and celebrated in riverfront developments across the world.



Image Source: <http://wellington.scoop.co.nz/?p=44270> Accessed 140520

Taranaki Wharf West, Wellington, NZ

(2011): This area was acknowledged as having a strong cultural significance for Maori with opportunities for a greater Maori presence along the river's edge. A key feature has been the construction of a waka (canoe) house, built around the location of a lagoon, and featuring:

- traditionally carved Maori waka on permanent display
- building design inspired by tukutuku patterns, ornamentation and clothing in Maori culture
- cultural activities and tours with Maori guides.

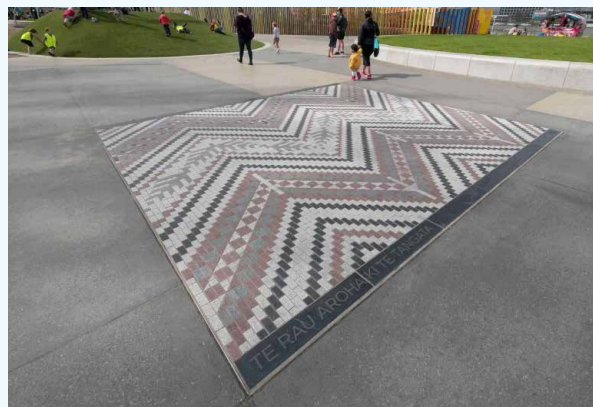


Image Source: <https://www.otakarold.co.nz/anchor-projects/avon-river-precinct/> Accessed 140720

Otakaro/Avon River, Christchurch, NZ

(ongoing): The redevelopment of Christchurch's riverfront is partly underpinned by Ngai Tahu, an historical narrative that sets out Maori values, customs and traditions relevant to the Otakaro/Avon River precinct. The project features:

- artworks highlighting Maori and European stories including one based on traditional woven mats acknowledging the Ngai Tahu concept of 'Kia atawhai ki te iwi' or care for your people
- a literary trail incorporating panels displaying quotes and pepeha - how to introduce yourself in Maori

People focus

As increasing urbanisation puts pressure on existing open space, many cities are turning to their riverfronts to provide diverse active and passive recreation facilities



Image Source: cfmoller.com/p/-da/Aalborg-Havnefront Accessed 140720

Aalborg waterfront, Aalborg, Denmark (2015):

A two phase project to improve people's access to and reconnection to the riverfront, featuring a range and scale of attractions for diverse users including:

- new exhibition/cultural centres & floating harbour pool
- central activities field, designed as a play space for all ages - playgrounds, skate park, basketball courts
- a terraced promenade: informal seating & water access
- various urban gardens providing space for respite and relaxation, with shelter from prevailing winds.

Case studies

Ecological focus

With increased risks from flooding and extreme weather events many cities are reassessing the potential for the design of their riverfronts to help mitigate the potentially damaging effects of climate change on communities and valuable urban infrastructure. Cities are also recognising the value of an ecological design approach in improving water quality and increasing biodiversity. The added benefits of providing city dwellers with access to nature and new recreational opportunities has been shown to have positive impact on levels of community health and well-being.



Image Source: <https://landezine-award.com/hunters-point-south-waterfront-park/> Accessed 14/07/20

Hunter's Point South Park - Phase I, Queens, NY (2013): This recently completed project on a 30 acre site along the waterfront of the East River is promoted as a new model of urban ecology and a prototype for storm resistant design.

Phase I was developed with a focus on active recreation and programmed space that provides activities to draw people to the water. The park is structured around a large multi use green oval which, in addition to providing sports facilities for local schools, also functioned successfully as a flood detention basin during hurricane Sandy, preventing flood damage to surrounding communities.



Image Source: <http://www.weissmanfredi.com/project/hunters-point-south-waterfront-park-phase-ii> Accessed 14/07/20

Hunter's Point South Park - Phase II, Queens, NY (2018): An additional 5.5ha park located to the south of Phase I with a focus on ecology and passive recreation. Key features include:

- 'soft' river edges designed to withstand flooding, control shoreline erosion and promote sediment stabilisation
- reintroduced wetlands, marsh habitat and richly planted bioswales creating ecological corridors along the river edge to improve biodiversity and water quality
- 'urban wilderness' for escape and contemplation
- multiple systems of paths and kayak launch.



Image Source: https://www.asla.org/2016awards/453251-Chicago_Riverwalk.html Accessed 14/07/20

The Jetty, Chicago Riverwalk, Illinois, USA (2016): Chicago Riverwalk aims to reclaim the inner city riverfront in sections to provide ecological, recreational and economic benefits to its community. Completed in 2016, The Jetty has been designed with an ecological focus, including:

- series of piers with floating wetlands attached
- innovative and low cost underwater features (lunkers, hulas and curtains) that support habitat development for fish living in the river
- interactive and educational experiences and opportunities to learn about river ecology.

Case studies

Urban plunge movement

Urban plunge is an international movement to clean up rivers to make them swimmable again with floating pools or beaches. It is hoped that providing a unique experience of open water swimming with a city backdrop will make people appreciate their rivers more, preventing further pollution and improving river ecosystems. In Australia, people may be able to eat the fish they catch in the river, returning an important food source to Aboriginal communities.



Image Source: <https://www.architecturaldigest.com/story/worlds-first-water-filtering-floating-pool-new-york-city-plus-pool> Accessed 14/07/20

+ Pool, East River, New York (concept stage): A proposal for a floating pool with perimeter walls that filter the river water from contaminants, bacteria and odours, creating clean water for swimming.

Investigative stages to establish feasibility and test the water filtration technology have been completed, supported by a crowd-funding campaign.



Image Source: https://inteng-storage.s3.amazonaws.com/img/iea/QjOdAB7QGd/sizes/paris-plages_resize_md.jpg Accessed 14/07/20

Paris Plunge, Paris (2017): Three temporary outdoor pool structures installed in the canal at Bassin de la Villette as part of the annual Paris Plage summer event. The pools are filled to varying depths with filtered water catering for children, families and serious swimmers.

Access is free with changing facilities and lifeguards provided. Accommodating up to 1,000 swimmers the event has been praised for providing families on a low income with valuable recreational opportunities and for offering urban residents the chance to cool down during heatwave events.

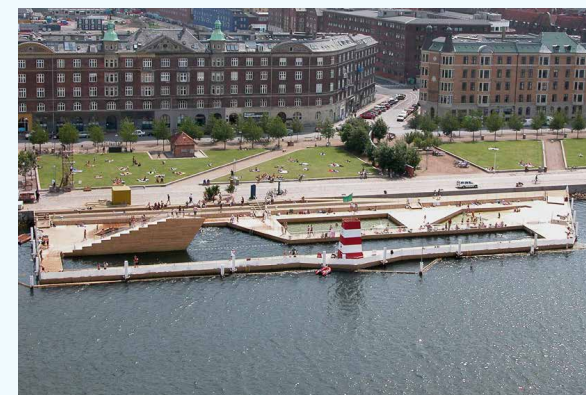


Image Source: <https://www.archdaily.com/search/all?q=harbour%20baths%20copenhagen%202002> Accessed 14/07/20

Harbour Baths, Copenhagen (2002): A system of four swimming and bathing facilities, the first of which opened in 2002.

The Danish government modernised their sewer system to divert waste water that previously discharged into the harbour. Water quality is tested daily and an online warning system alerts if the water quality is poor and the pools are closed.

12 quality criteria - what makes a great riverfront?



Safety and Security

- Allow for passive surveillance
- Overlapping functions day and night
- Well lit/lighting to human scale
- Well maintained
- CCTV



Opportunities to walk and ride

- Room for walking
- Dog walking
- Good surfaces
- Accessibility for everyone



Opportunities to sit, stand and stay

- Attractive and functional edges
- Pleasant views, people watching
- Good mix of seating
- Resting opportunities



Dimensioned at human scale

- Dimensions of structures and spaces at human scale (in relation to senses, movement, size and behaviour)



Landscape & biodiversity

- Water sensitive urban design
- Tree canopy
- Create habitat
- Beauty and activation every season
- Promote cooling



Positive sensory experience

- Good design and detailing
- Quality materials
- Fine views/vistas
- Rich sensory experiences: trees, plants, water



Protection against unpleasant sensory experiences

- Dust, noise, glare
- Climate
- Traffic



Opportunities to see

- Reasonable viewing distances
- Unhindered views
- Interesting views
- Lighting at night



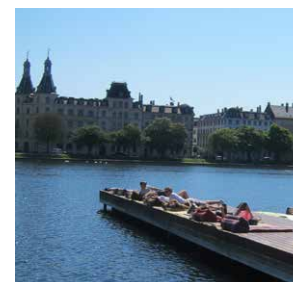
Opportunities to talk and listen

- Low noise levels
- Public seating arrangements conducive to communicating



Opportunities for play and exercise

- Allow for physical activity
- Temporary activities (markets, festivals etc)
- Access to the water
- By day and night
- In summer and winter



Opportunities to enjoy the positive aspects of climate

- Sun/shade
- Heat/coolness
- Shelter from wind/breeze



Identity and sense of place

- Acknowledge history of the place
- Embrace and integrate key characteristics of the landscape

Key urban design principles

Perth's Riverfront will be underpinned by the following urban design principles:



PLACE

- celebrate Whadjuk Nyoongar culture
- reveal overall history
- welcome all with diverse uses & supporting facilities
- create a comfortable & safe environment



MOVEMENT

- enhance movement to
- enhance the riverfront promenade experience
- strengthen linkages to the city
- ensure accessibility for all users



ENVIRONMENT

- repair and soften water edges
- adapt to increased flooding and drought
- treat storm water before it enters the river
- develop ecological networks
- nurture habitat
- increase canopy cover and promote cooling



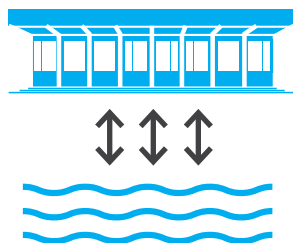
Future riverfront opportunities

Key moves

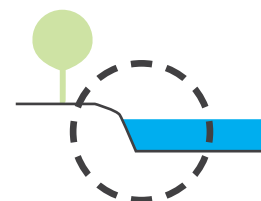
The following key moves should feature in all future designs for Perth's Riverfront. They are reflected in three high level exploratory approaches that show preliminary ideation concepts for riverfront as follows: A simple approach, Archipelago and Ecological. These concepts acknowledge key design ideas and concepts from previous plans and studies that remain relevant today.



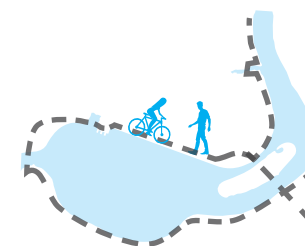
Consolidate Supreme Court Gardens, Stirling Gardens and Government House Grounds



Reconnect the Concert Hall with the river



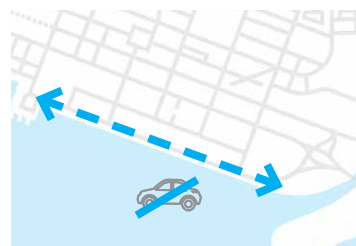
Soften and vary the river edge



Create a cohesive public waterfront promenade prioritising pedestrians



Connect adjacent streets to the river and upgrade pedestrian and cycle amenity



Downgrade or remove Riverside Drive



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